作成承認印	配布許可印
ニコン映像カンパニー CS推進部 GM	

AF-S Nikkor ED 400mm/f2.8D Ⅱ IF

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

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Specifications

1. Main specifications

Focal length:	400mm	
Maximum aperture:	1:2.8	
Lens construction:	11elements in 9groups (One protective glass is built in.)	
	ED glass (G2, G3, G6)	
Picture angle:	With 135 system camera	6° 10′
	With IX240 system camera	5° 06′
	With Nikon Digital camera D1	4° 00′
Distance scale:	∞～3.4m	
Focusing:	G6～G8 Moving type	
Aperture scale:	2.8, 4, 5.6, 8, 11, 16, 22	
Diaphragm:	Full automatic (Minimum aperture lock is possible.)	
Mount:	Nikon F mount	
Filters:	Rear setting type52mm (P=0.75mm)	
Tripod socket:	360° rotary type	
Dimension:	159.5mm (dia) ×359.5mm (Maximum length)	
Weight:	Approx4,440g (Including the tripod socket)	

2. Function

Operation outline

AF : Automatic focus FA : Focus aid AE : Automatic exposure

Camera body \ Lens	AF	FA	AE
F5, F4, F100, F90, F90X, F80, F70D PRONEA600i, PRONEA S, D1	○	○	○
AF Cameras except the above cameras (except F3AF)	×	○	○
Others except AF	×	×	○
F3AF	×	×	×

Focus mode

M : Manual focus AF : Automatic focus FA : Focus aid

Camera body \ Focus mode		Lens mode: M	Lens mode: M/A	Lens mode: A
F5, F4, F100, F90, F90X, F80 F70D, PRONEA600i PRONEA S, D1	C	MF photographing (FA is available.)	Prior MF/AF photographing	AF photographing
	S			
	M	MF photographing (FA is available.)		Not usable
AF Cameras except the above cameras (except F3AF)	C	MF photographing (FA is available.)		Not usable
	S			
	M			
Others except AF		MF photographing		Not usable

MF photographing: The MF ring is rotated manually.

Prior MF/AF photographing: AF is actuated by lightly pressing the shutter release button. AF mode is changed to MF mode by rotating the MF ring manually while AF is actuated. MF mode is changed to AF mode by returning the shutter release button, and then AF is actuated by pressing the button lightly.

AF photographing: AF is actuated by lightly pressing the shutter release button.

3. Mount contacts

Contact	Contact Name	Application
A	Vcc	Power terminal of the lens CPU circuit
B	R／W 1	Lens special lead/light terminal
C	CLOCK	Input of clock
D	DATA	Command input/data input and out put
E	Hot line・Pulse	Relative distance pulse output
F	Power supply for heavy load	Power supply for heavy load such as motor
G	GND for heavy load	GND for heavy load such as motor
H	Hot line・Pulse	Relative distance pulse output
I	Teleconverter CLOCK	Communication with teleconverter
J	Teleconverter DATA	Communication with teleconverter
Mount		Signal GND

＊The contacts are arranged in the order of A～J counterclockwise as viewed behind the lens（mount side）.

4. Accessories

Front cap		
・Lens cap		(JXA10094)
Rear cap		
・Lens rear cap	LF-1	(JAD50101)
Teleconverter		
・Special teleconverter	TC-14E	(JAA90851)
	TC-20E	(JAA90951)
	TC-14E II	(JAA91051)
	TC-20E II	(JAA91151)
・Teleconverter	TC-14BS	(JAA90302)
	TC-301S	(JAA90203)
Case		
・Trunk case	CT-402	(JAE91401)
・Semi - soft case	CL-L2	(JAE30201)
Hood		
・Covering hood	HK-27-1, 2	(JAB63001)

Not mountable products

※Because of the interference of the lens mount contact part

・Automatic extension ring	PK-1	(20FA33P1)
	PK-11	(FPW00702)
	PK-11A	(FPW00703)
・K ring	K1	(20FA32K)
・Automatic ring for bellows	BR-4	(FPW00401)

DISASSEMBLING/ASSEMBLING/ADJUSTMENT

Notes:

The basic structure of AF-S400/2.8D II (JAA52551) is almost the same as the former AF-S telephoto lens.

The procedure for [DISASSEMBLING/ASSEMBLY/ADJUSTMENT] is mentioned from the next page, but they were simplified.

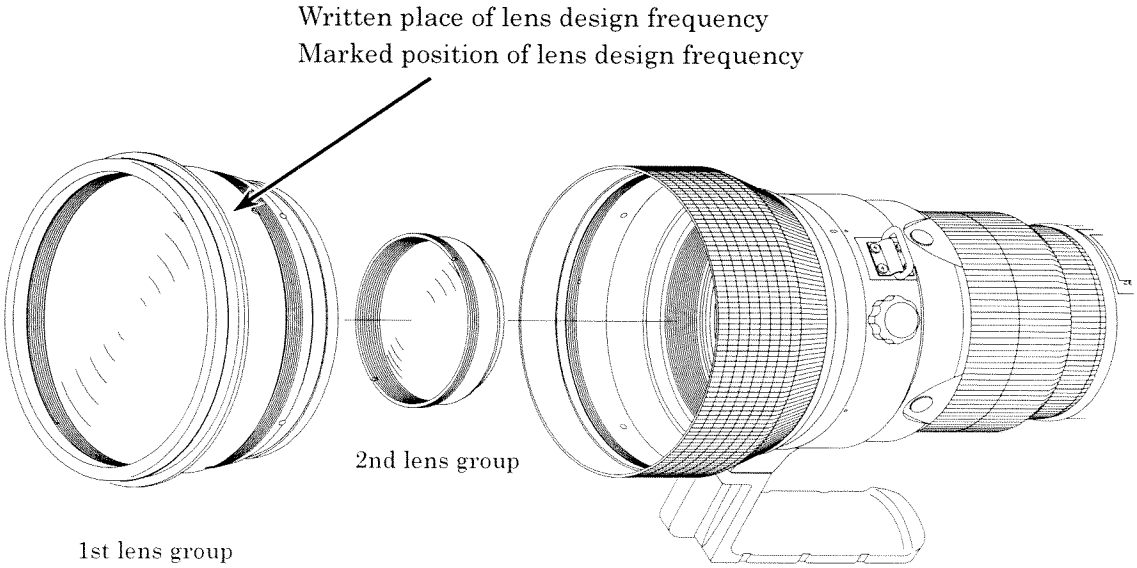
Therefore, for the details, please refer to the explode diagram or Repair Manual of the former products.

【Design frequency of lens】

The refractive index of a lens glass is different for every production lot. One glass has almost the same refractive index as the other if they are produced in the same lot. If the production lot of one glass is different from the other, the radius of curvature must be changed according to the change of the refractive index. The optical design for this reason is called "design frequency".

When a glass produced in a different lot is used for replacement during lens repair, aberration or others are adversely affected and a trouble occurs.

When repairing a part of glass with the design frequency, the glass with the same design frequency must be used.



Note : The number of times of designing the lens shall be stated as follows.

For the first time: No mark

For the first half of second time: No mark

For the latter half of second time: Marking made as '2R'

For the third time: Marking made as '3R'

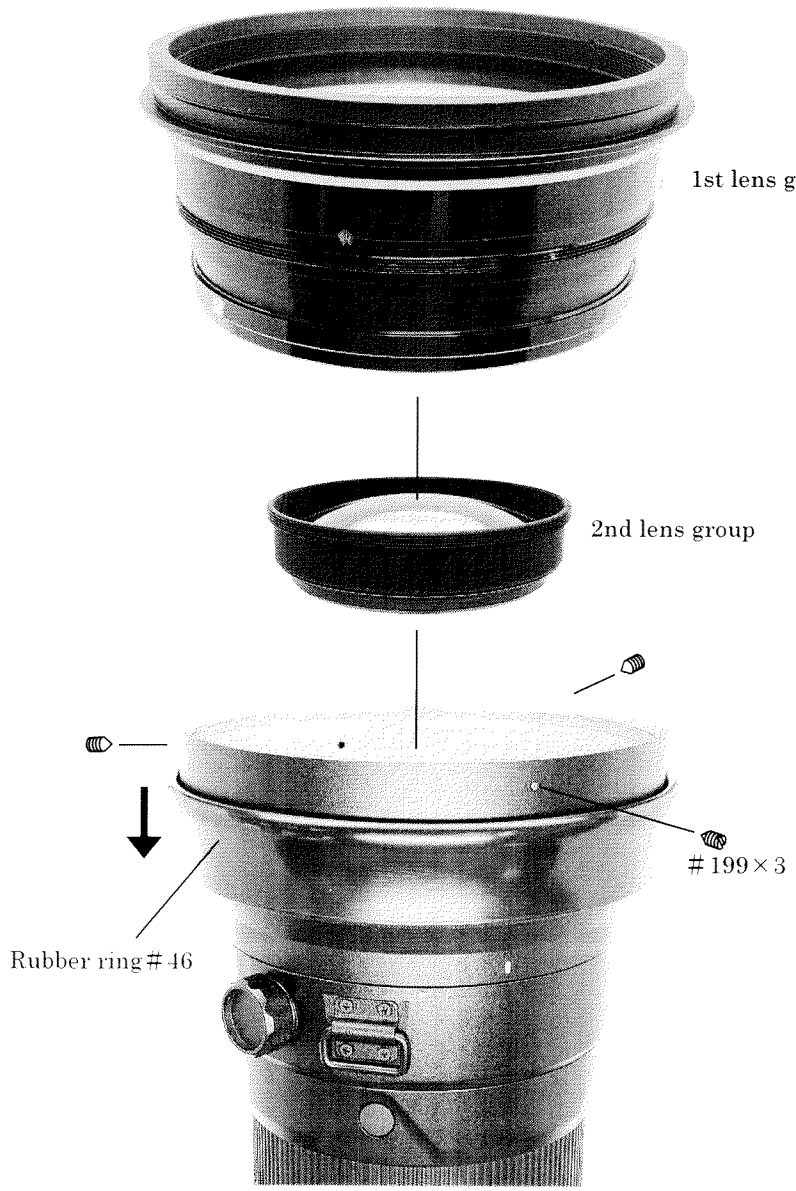
Followed by '4R', '5R', '6R' and so on.

DISASSEMBLING/ASSEMBLING/ADJUSTMENT

Notes : ①This [DISASSEMBLING/ASSEMBLY/ADJUSTMENT] is mentioned with the lens without the L-shaped tripod for convenience' sake.
②For disassembly, be sure to memorize where the lead wire(s) should go and how the FPCs should be placed and attached.
③Due to the trial product(s) used in the disassembly/assembly/adjustment processes, the shape may be sometimes different from the actual product(s).
④Due to specifically processed product(s) in the photo(s), the appearance of product(s) may be different from the actual one(s)'.

1. DISASSEMBLING

1st~2nd LENS GROUP

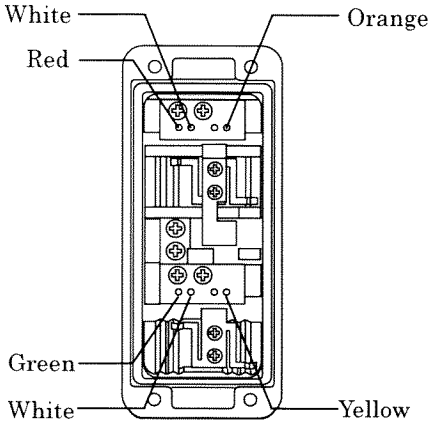


①Move the rubber ring #46 a little in an arrow direction.

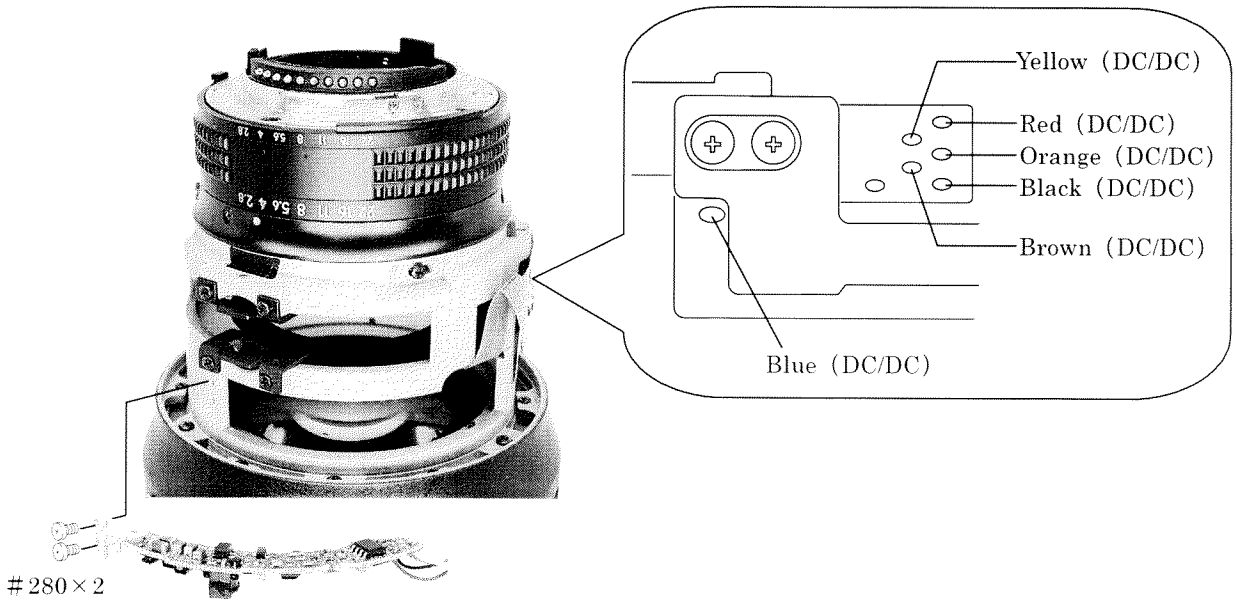
②Loosen #199 x 3 to remove the 1st lens unit.

③Remove the 2nd lens unit.

REAR HOUSING, CHANGE-OVER SWITCH UNIT

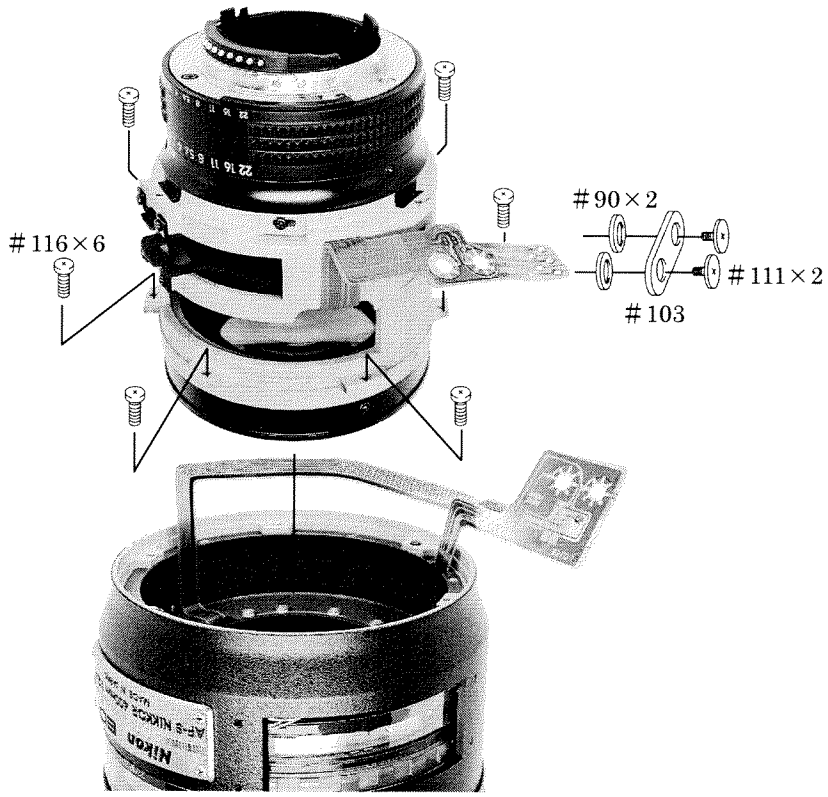


DC/DC CONVERTER

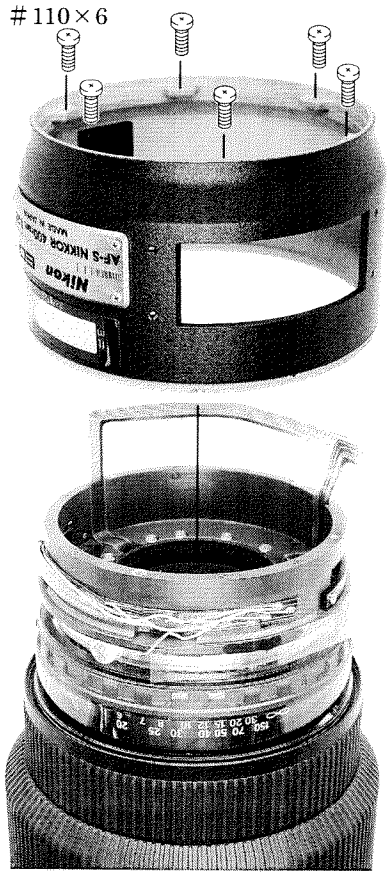


DC/DC converter

SEPARATION OF THE REAR GROUP



INDEX RING

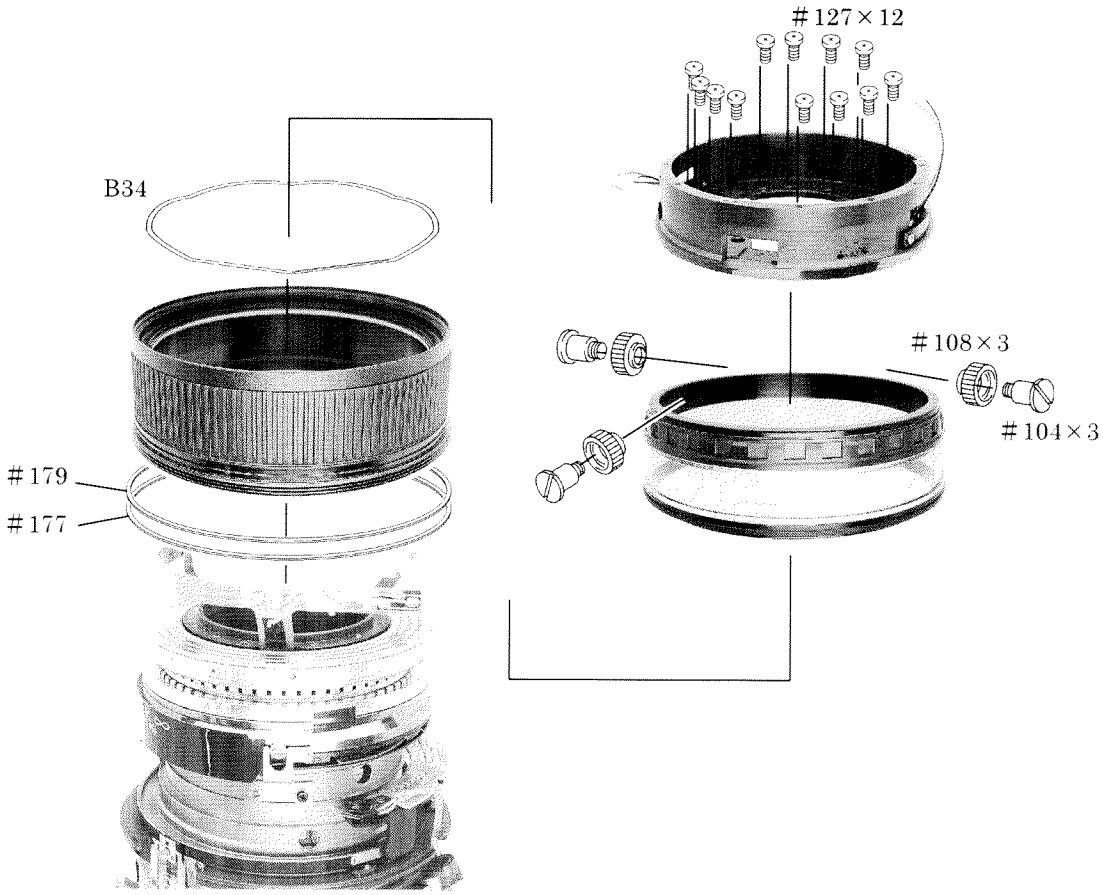


MF RING

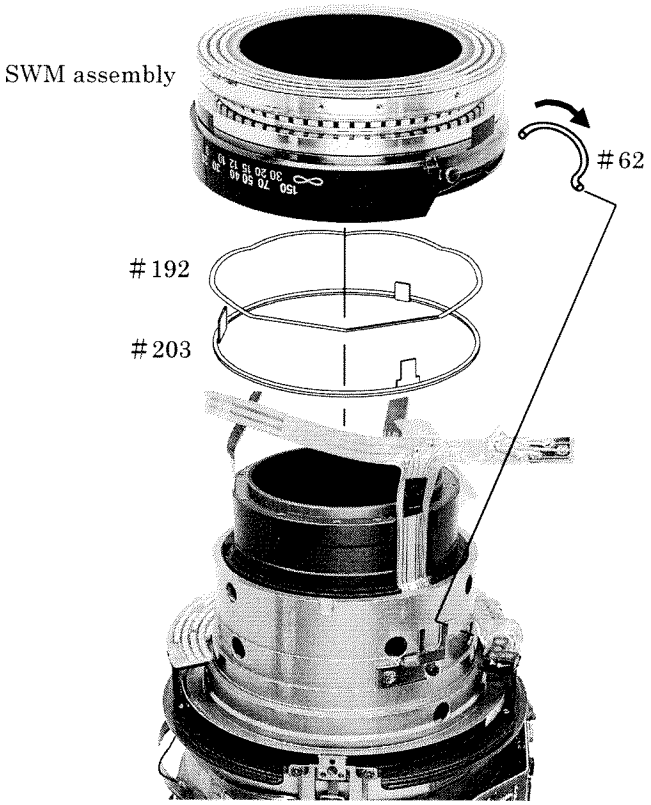
①Loosen the screw #277 under the rubber ring #176.

②Rotate the MF ring in an arrow direction to remove it.

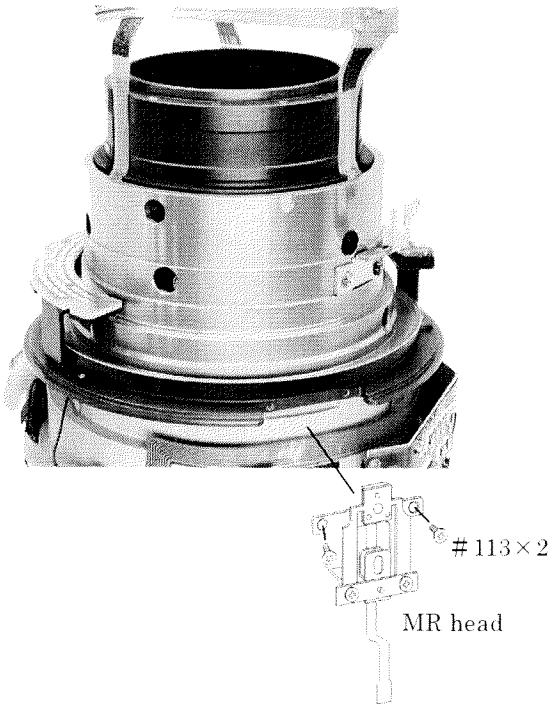
RETAINING RING, ROTATION DETECTION BASE PLATE, TRANSPARENT RING



SWM ASSEMBLY

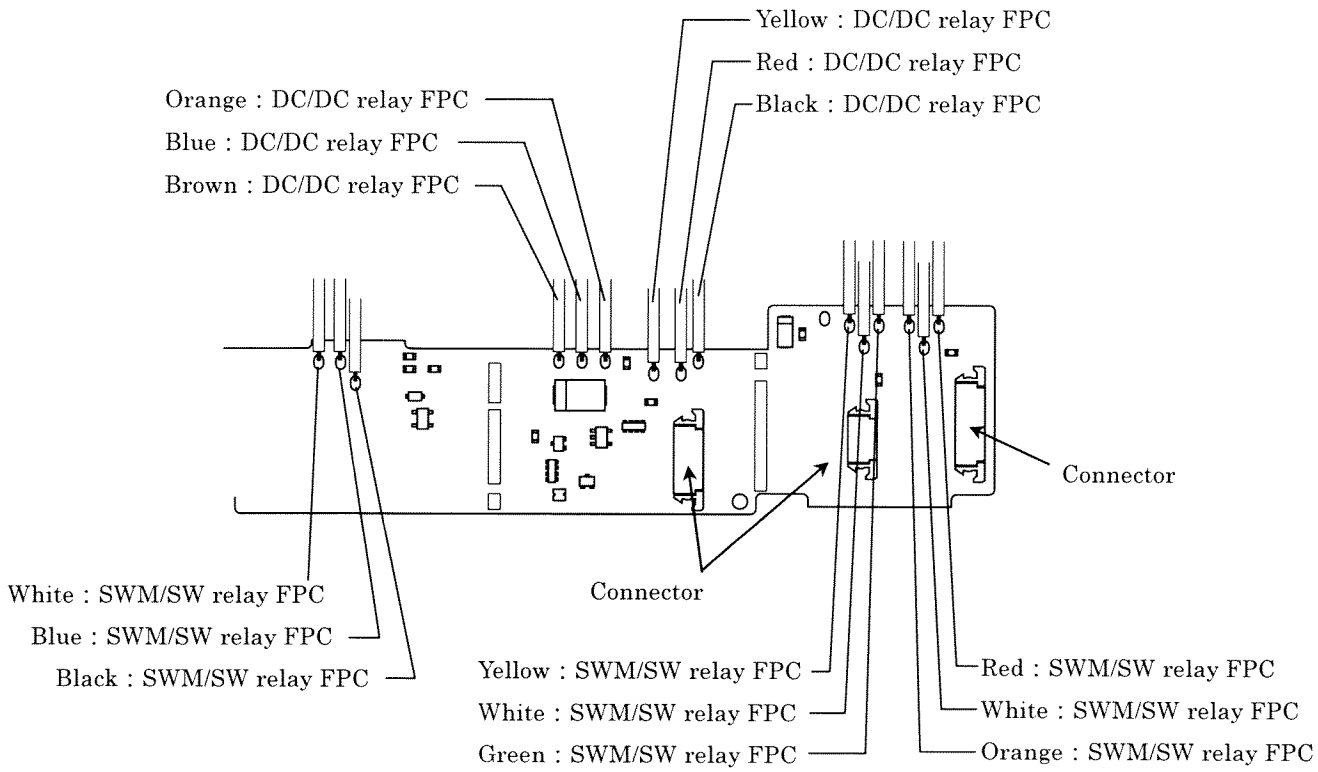


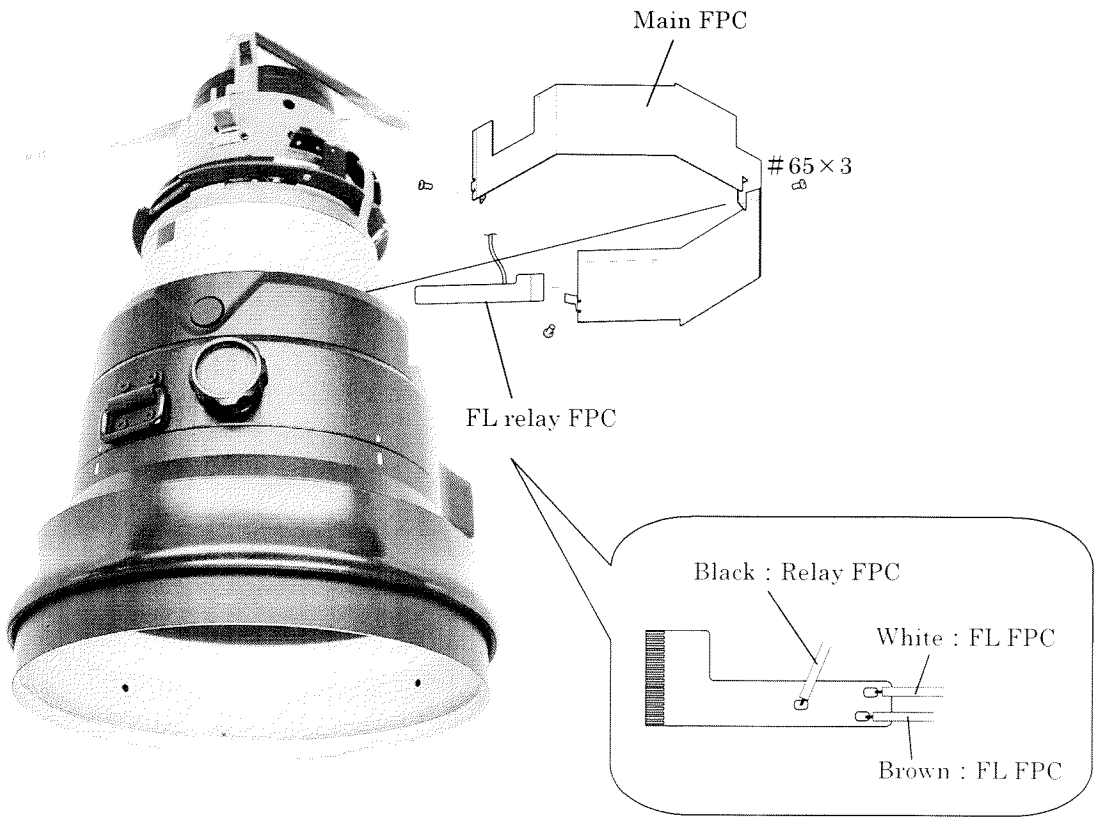
MR HEAD



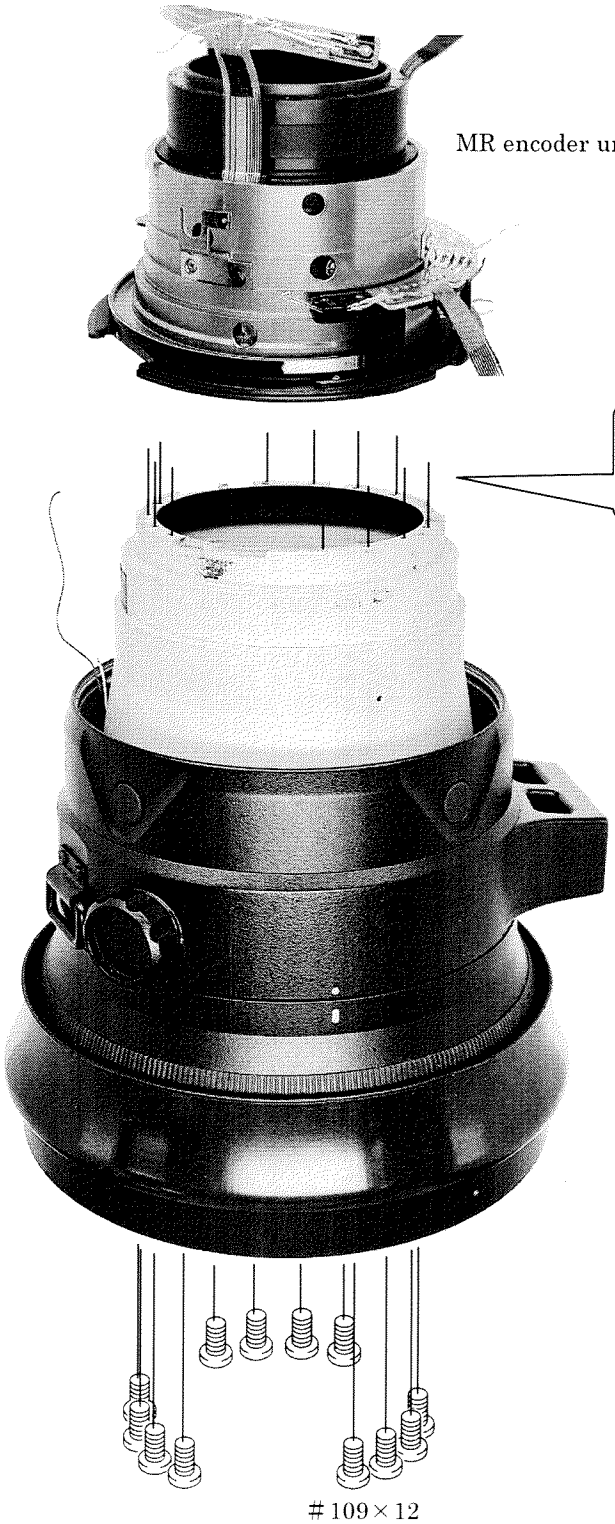
MAIN FPC

・Remove the solders of the cords and the relay FPCs from the 3 pieces of the connectors.


Yellow : DC/DC relay FPC
Red : DC/DC relay FPC
Black : DC/DC relay FPC
Orange : DC/DC relay FPC
Blue : DC/DC relay FPC
Brown : DC/DC relay FPC
Connector
White : SWM/SW relay FPC
Blue : SWM/SW relay FPC
Black : SWM/SW relay FPC
Connector
Yellow : SWM/SW relay FPC
White : SWM/SW relay FPC
Green : SWM/SW relay FPC
Red : SWM/SW relay FPC
White : SWM/SW relay FPC
Orange : SWM/SW relay FPC

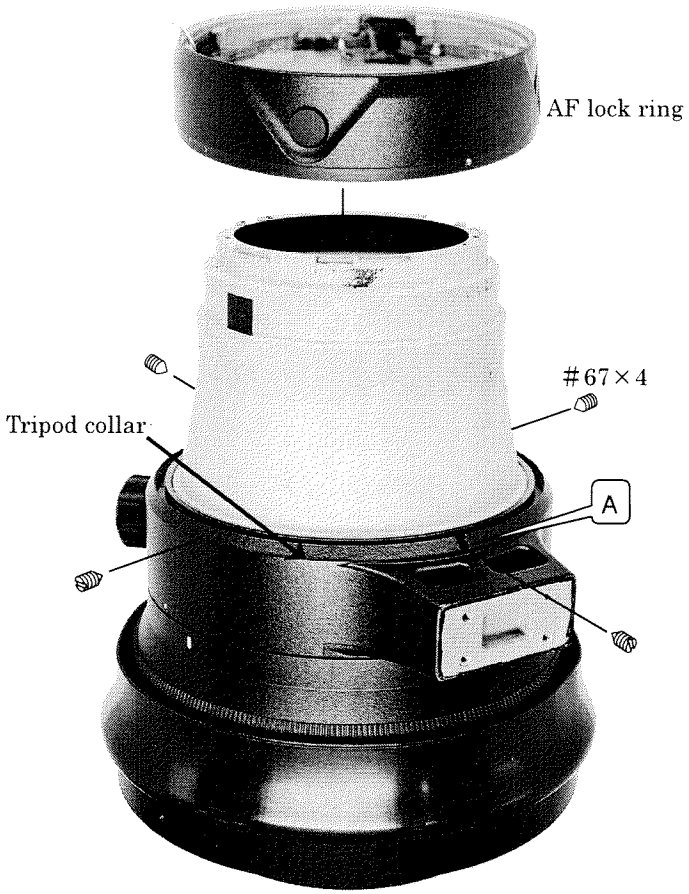


MR ENCODER UNIT



Notes: Be careful not to cut the relay FPCs when removing the MR encoder unit.

AF LOCK RING



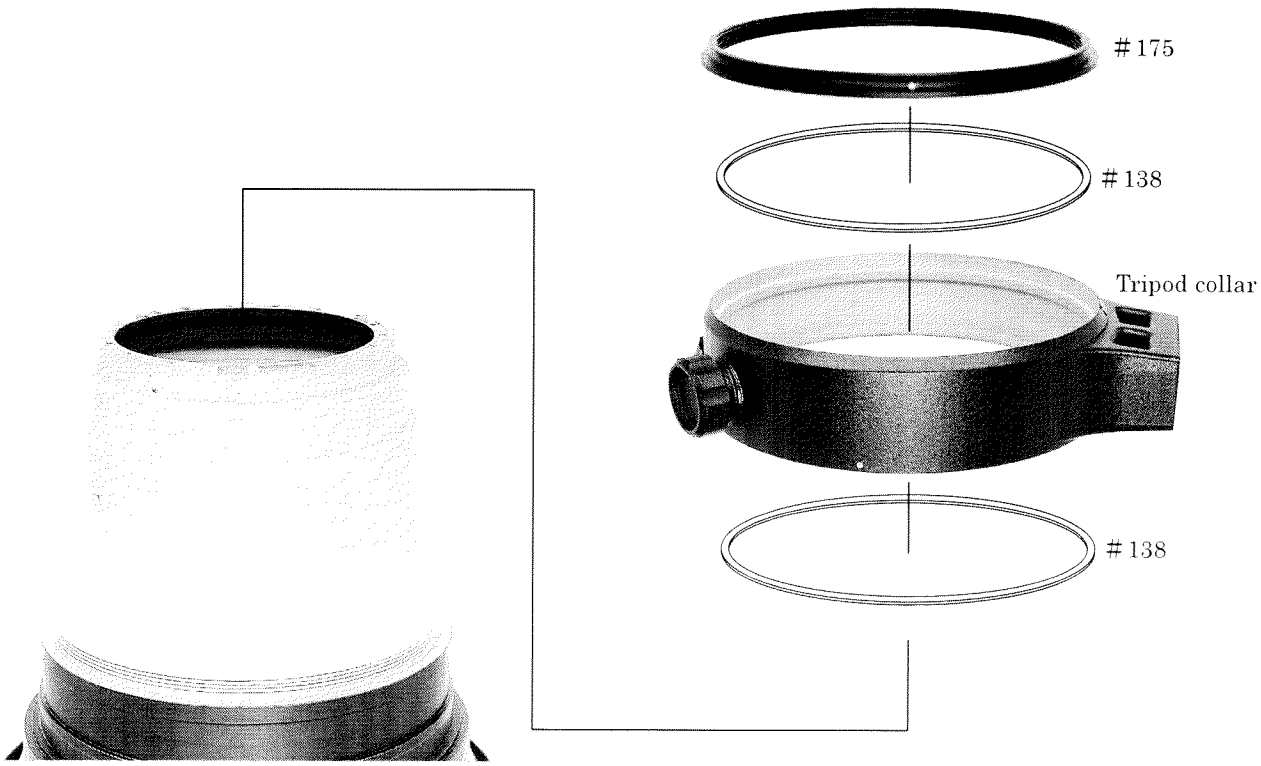
①Rotate the tripod collar to set the groove [A] to one of #67.

②Remove #67.

③Remove the other 3 pieces of #67 in the same way.

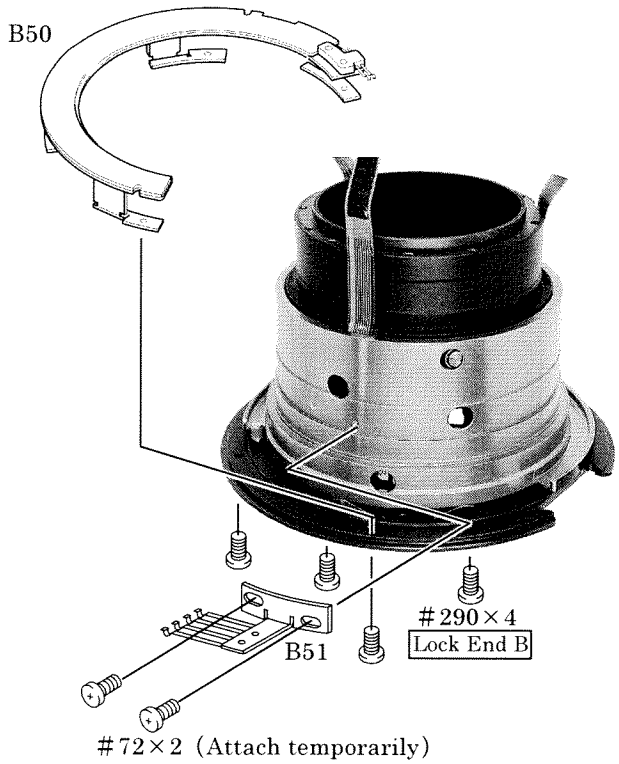
④Remove the AF lock ring unit.

TRIPOD COLLAR



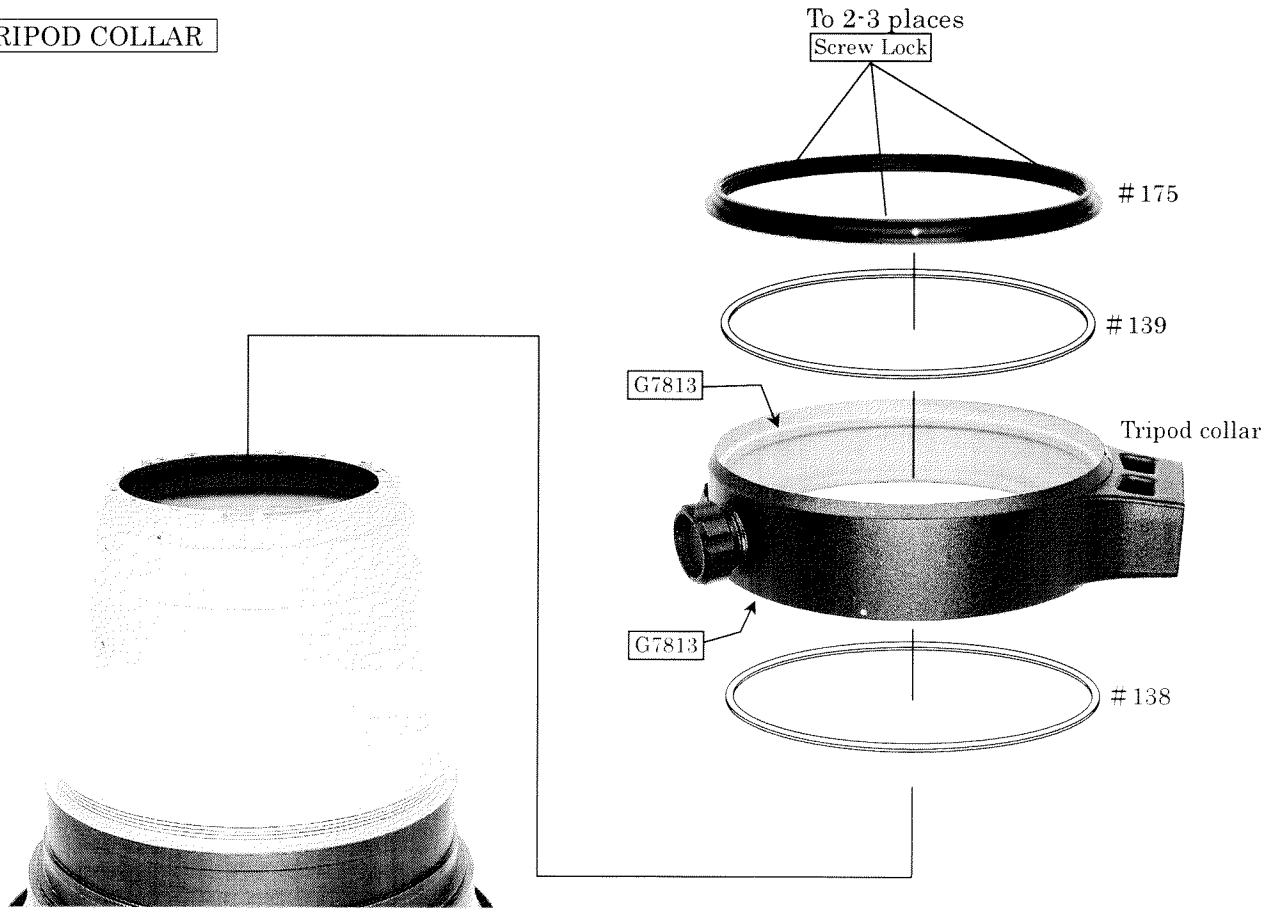
2. ASSEMBLING/ADJUSTMENT

DISTANCE ENCODER, DISTANCE ENCODER BRUSH

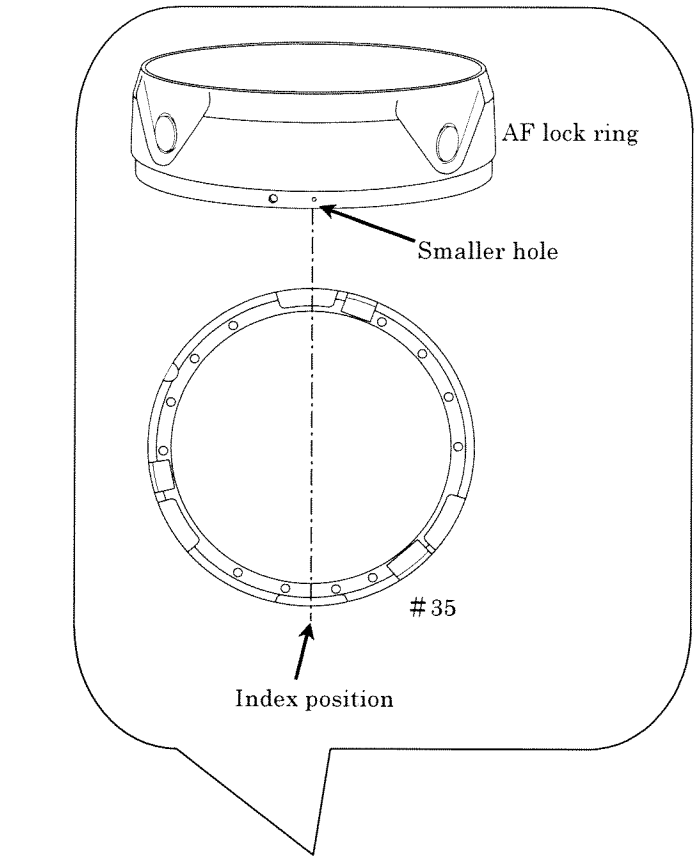


Notes: If you need to disassemble further than the distance encoder B50 and/or the distance brush B51, please replace the focus fixed tube unit B52.
Because the torque of the B52 is adjusted after it is assembled up to the B51 at the factory.

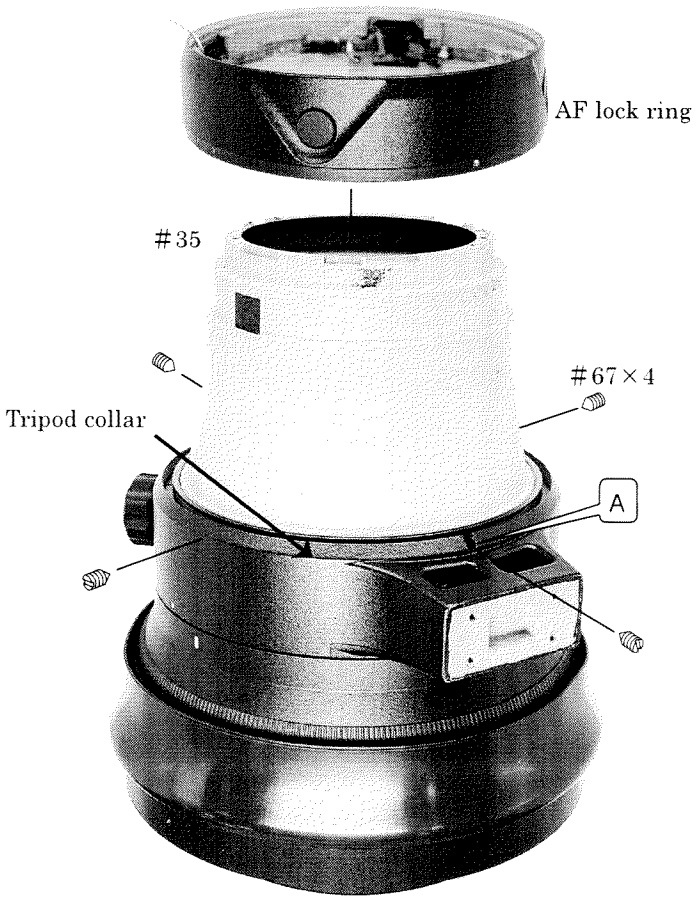
TRIPOD COLLAR



AF LOCK RING



①Assemble the AF lock ring and #35 so that the smaller hole of AF lock ring and the index position may be aligned.



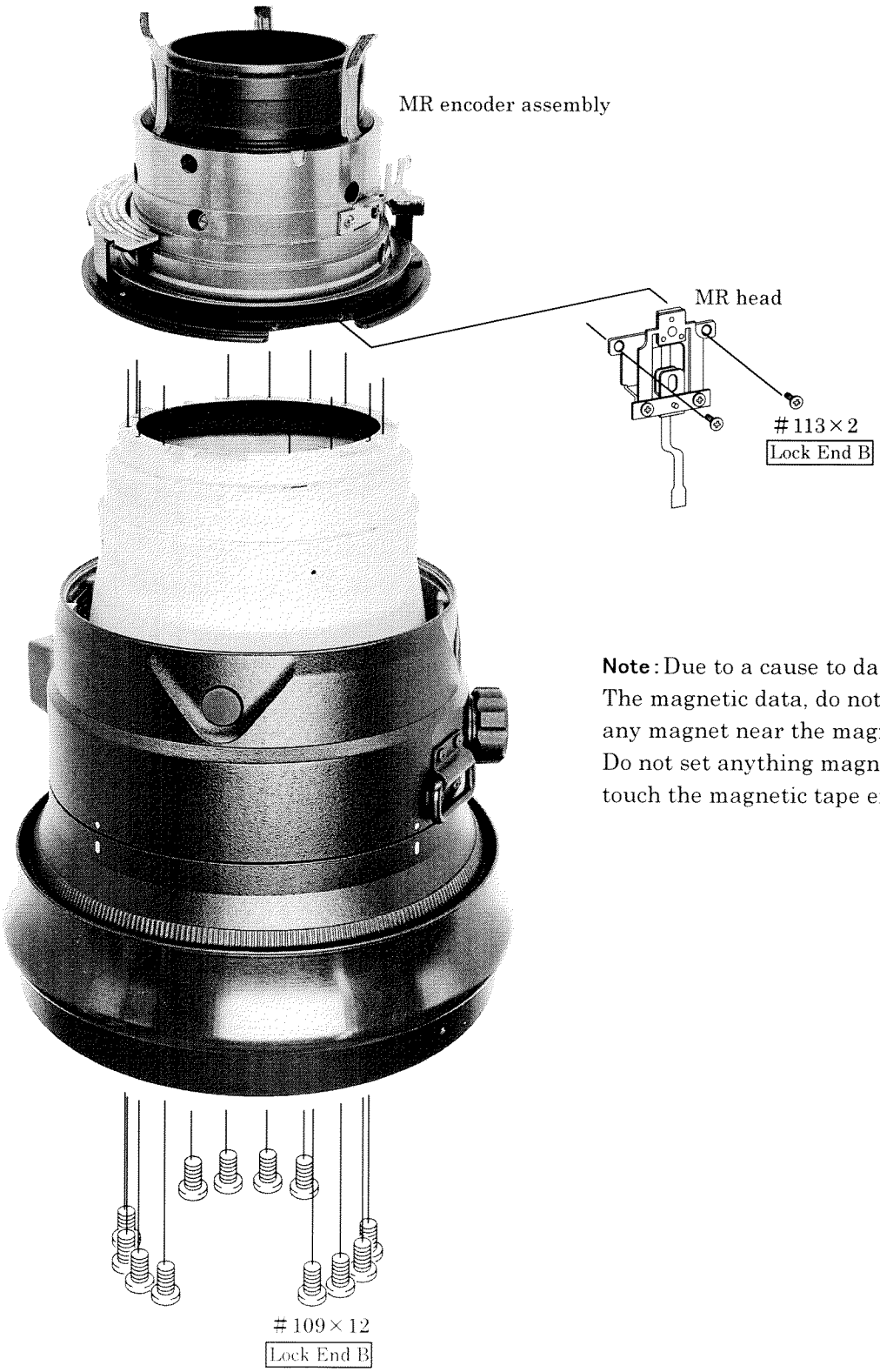
②Rotate the tripod collar to set the groove [A] to one tapped hole of the AF lock ring .

②Tighten #67.

③Tighten the other 3 pieces of #67 in the same way.

Notes: Tighten the 4 pieces of the screws #67 temporarily.

MR ENCODER ASSEMBLY, MR HEAD



Note: Due to a cause to damage
The magnetic data, do not place
any magnet near the magnetic tape
Do not set anything magnetic to
touch the magnetic tape either.

INSPECTION AND ADJUSTMENT FOR THE WAVEFORM OUTPUT FROMMR ENCODER

・In case of replacing the MR tape or the MR head, be sure to conduct adjustment.

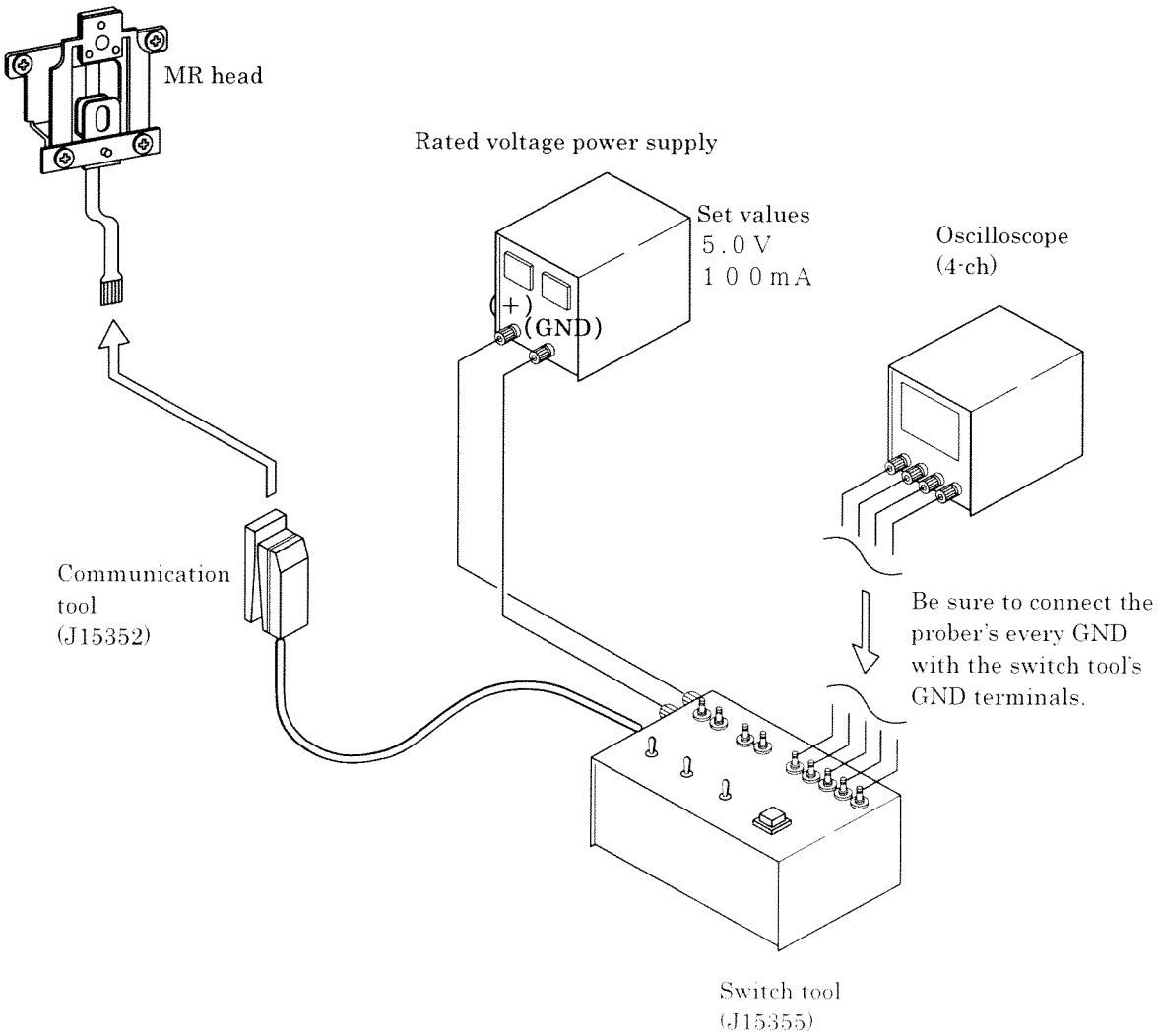
1．Equipment and tools to be required

・Rated voltage power supply for single output：Q'ty 1 With 5.0V and 100mA, applicable for the switch tool
・Oscilloscope：1
・Communications tool J15352：1
・Switch tool J15355：1

Note: In case of any trouble in conduction between the communications tool and the relay FPC, there may be corrosion or oxidation on the contact surface of relay FPC.
In this accord, be sure to polish the contact surface prior to getting connected with the communications tool.

2．Preparation of the lens applicable for measurement

・As shown in the figure below, connect the rated voltage power supply with the measuring tool and the communications tool.



3．How to conduct inspection and adjustment

①Turn off the switch tool's switch 1 and 2. Then, turn the switch 3 on.

②Check whether or not both current and voltage from the connected rated voltage power supply are set values.

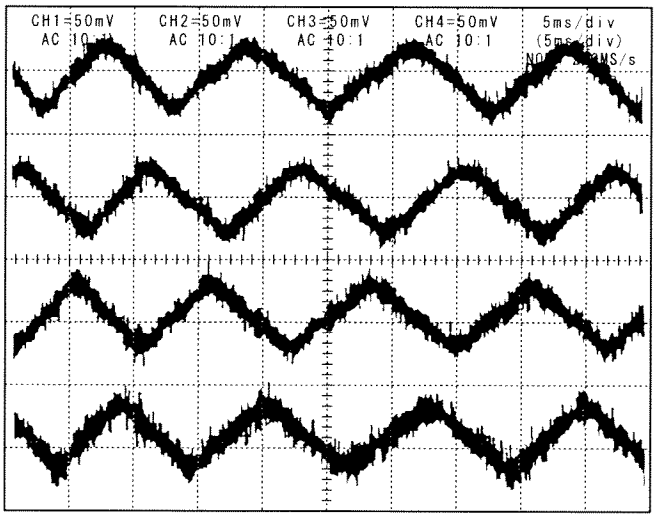
If they are to meet the set values, turn the main switch on.

③Set the oscilloscope.

Driving the＃24 of the MR encoder unit.

④Stop the waveform from the oscilloscope by 'START/STOP' key and check it.

Note: Since the shape of waveform varies according to the driving speed of ＃24, particularly and properly set Time/Div.



· Setting of oscilloscope

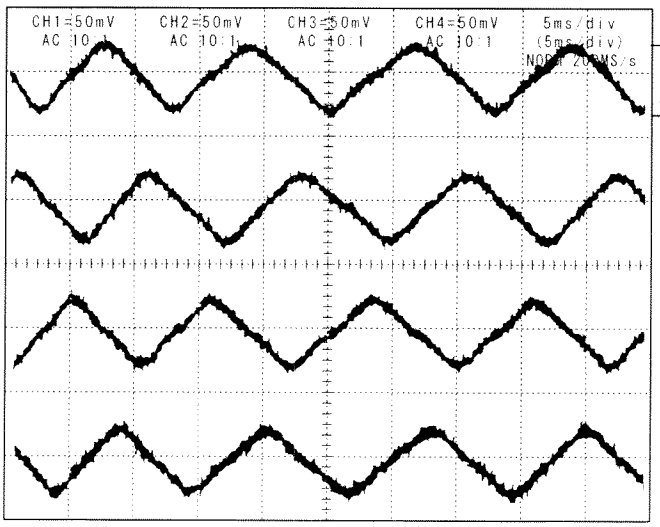
V／Div（CH１）	：５０ｍV
V／Div（CH２）	：５０ｍV
V／Div（CH３）	：５０ｍV
V／Div（CH４）	：５０ｍV
Coupling	：ＡＣ
Time／Div	：５ｍｓ（reference）

⑤In the case of detecting any wider waveform noise, use the filter function.

How to set the filter function in the employment case of Yokogawa - manufactured DL1540

１．Press the filter button.

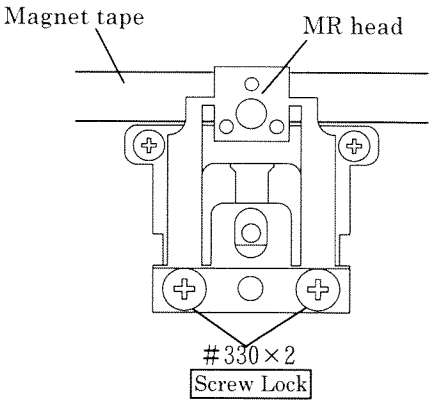
２．Select 'Smooth' in the menu on PC screen.



Criteria : The amplitude of every pulse/waveform should be more than 40mV.

Precaution : Check the waveform by letting the focus ring to travel from the infinity - end position to the nearest distance and vice versa.

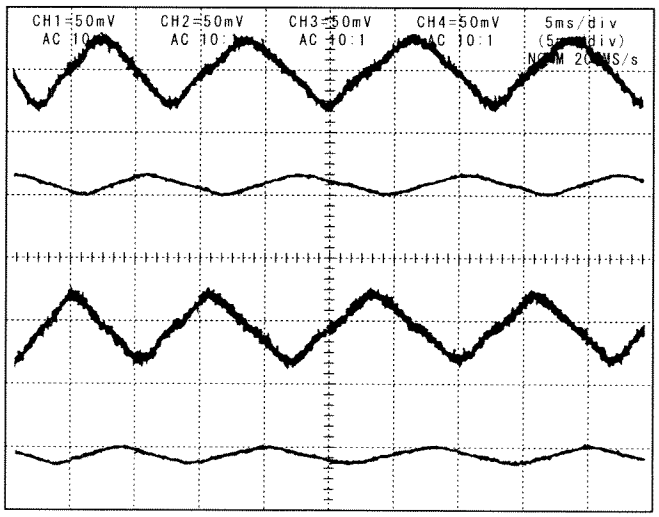
⑥In the case of smaller amplitude, for adjustment, loosen two pieces of the screw #330 and then shift the MR head position as shown in the right figure.



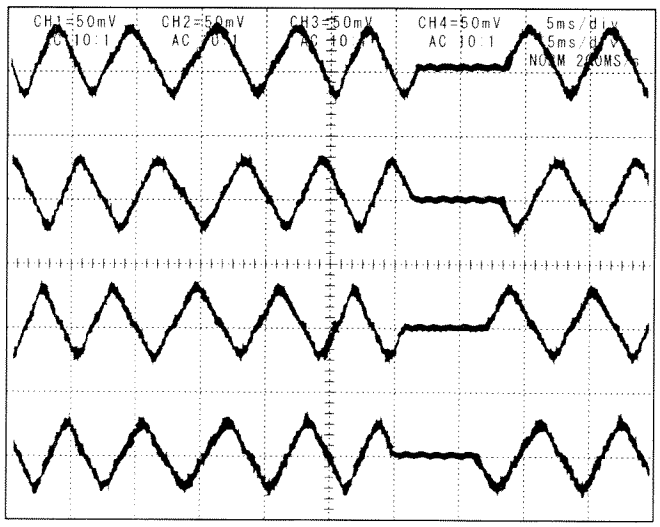
Precaution: Due to a cause to damage the magnetic data, during adjustment, avoid that the magnet tape and the MR head touch the magnetism - maintained driver bit.

《Reference》

・In case the amplitude of either 'CH1 and 3 phases' or 'CH2 and 4 phases' combination seems smaller, either of the two screws may loosen.
Then, check the screws.
Or, in case the both screws are enough tightened, the MR head may be troubled.
Then, be sure to replace the MR head unit B19 and adjust it again.

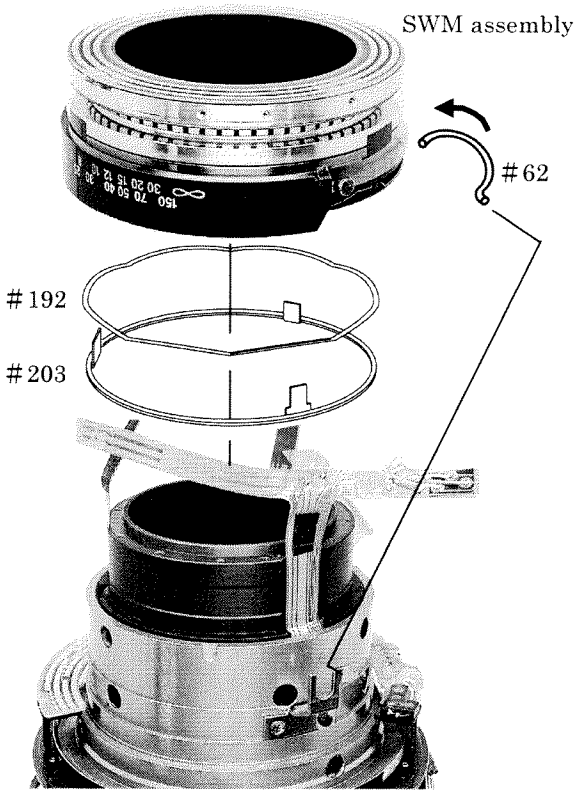


・In case of a presence of partial drop in the amplitude between the infinity and the closest distance, the magnetic data in magnetic tape may be damaged.
Then, replace the magnetic tape and adjust it again.

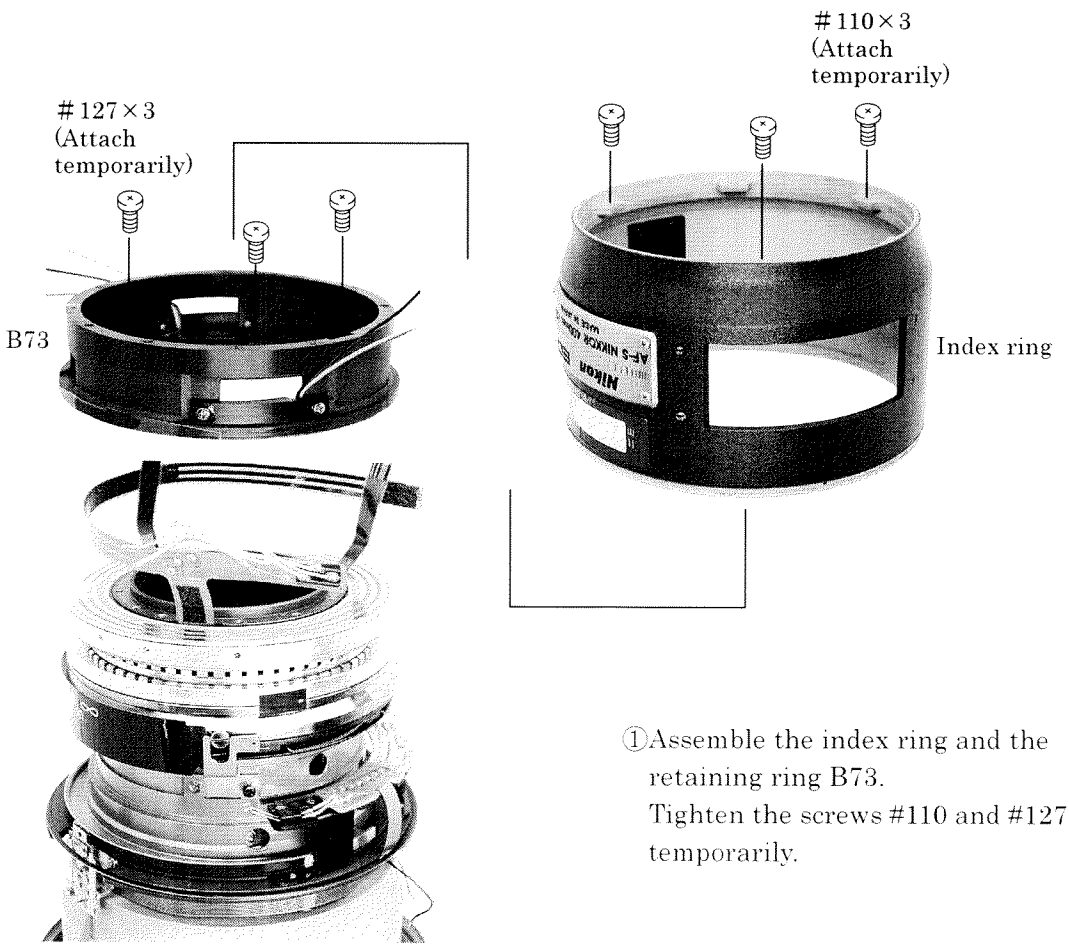


⑦Turn the rated voltage power supply off.

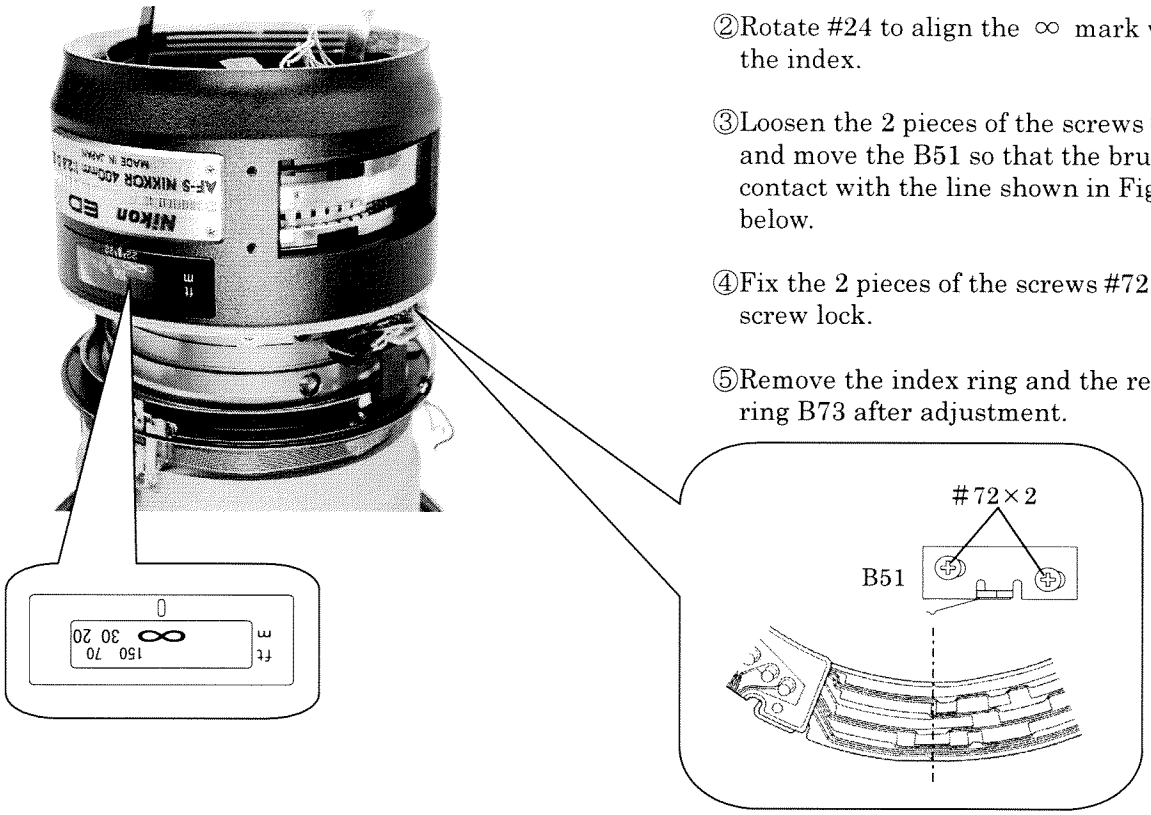
SWM ASSEMBLY



ADJUSTMENT OF DISTANCE ENCODER BRUSH POSITION



①Assemble the index ring and the retaining ring B73.
Tighten the screws #110 and #127 temporarily.



②Rotate #24 to align the ∞ mark with the index.

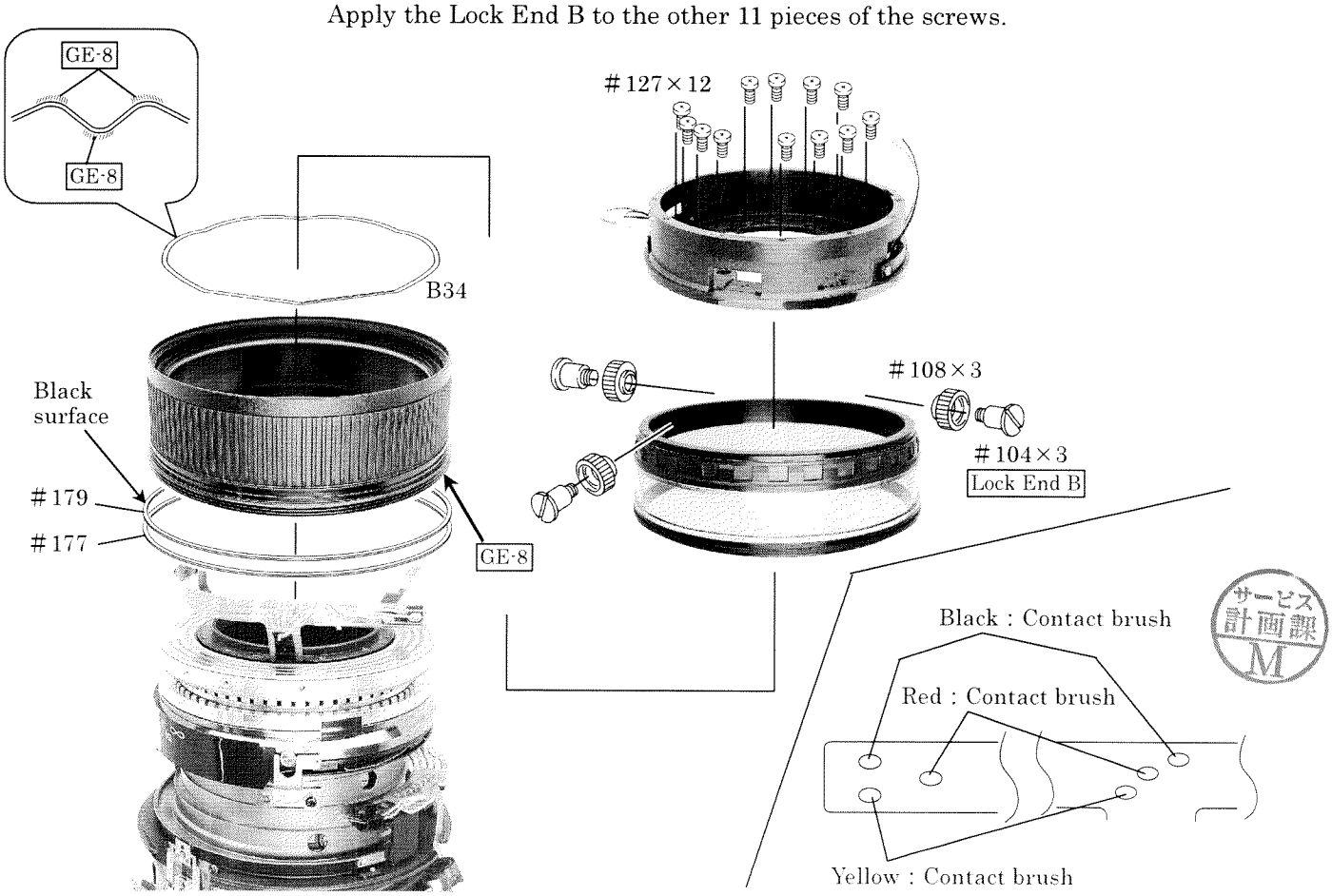
③Loosen the 2 pieces of the screws #72 and move the B51 so that the brush may contact with the line shown in Figure below.

④Fix the 2 pieces of the screws #72 with screw lock.

⑤Remove the index ring and the retaining ring B73 after adjustment.

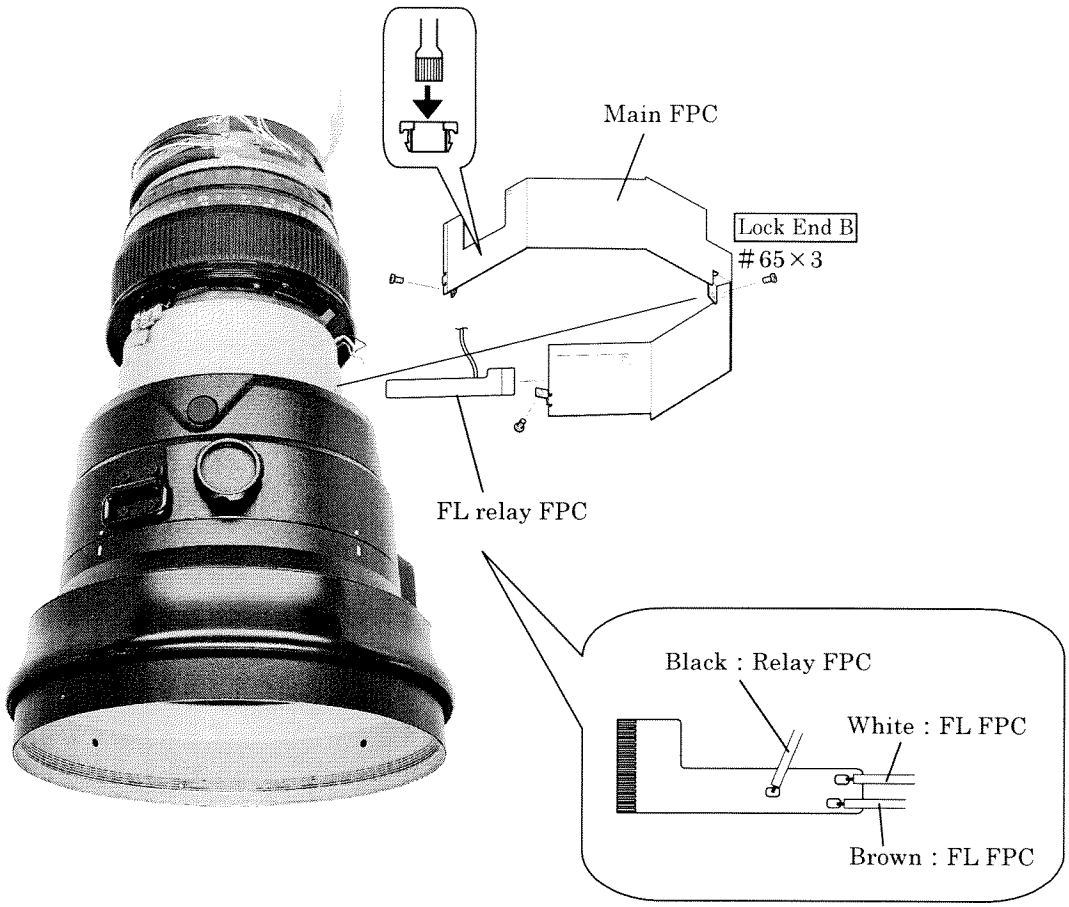
RETAINING RING, ROTATION DETECTION BASE PLATE, TRANSPARENT RING

⚠ (Addition) **Notes :** Do not apply the adhesive to the 1 piece of the screws #127×12, which is tightened in the screw hole that is used for the body ground (not painted hole), but apply the Screw Lock to the screw after tightening the screw.
Apply the Lock End B to the other 11 pieces of the screws.

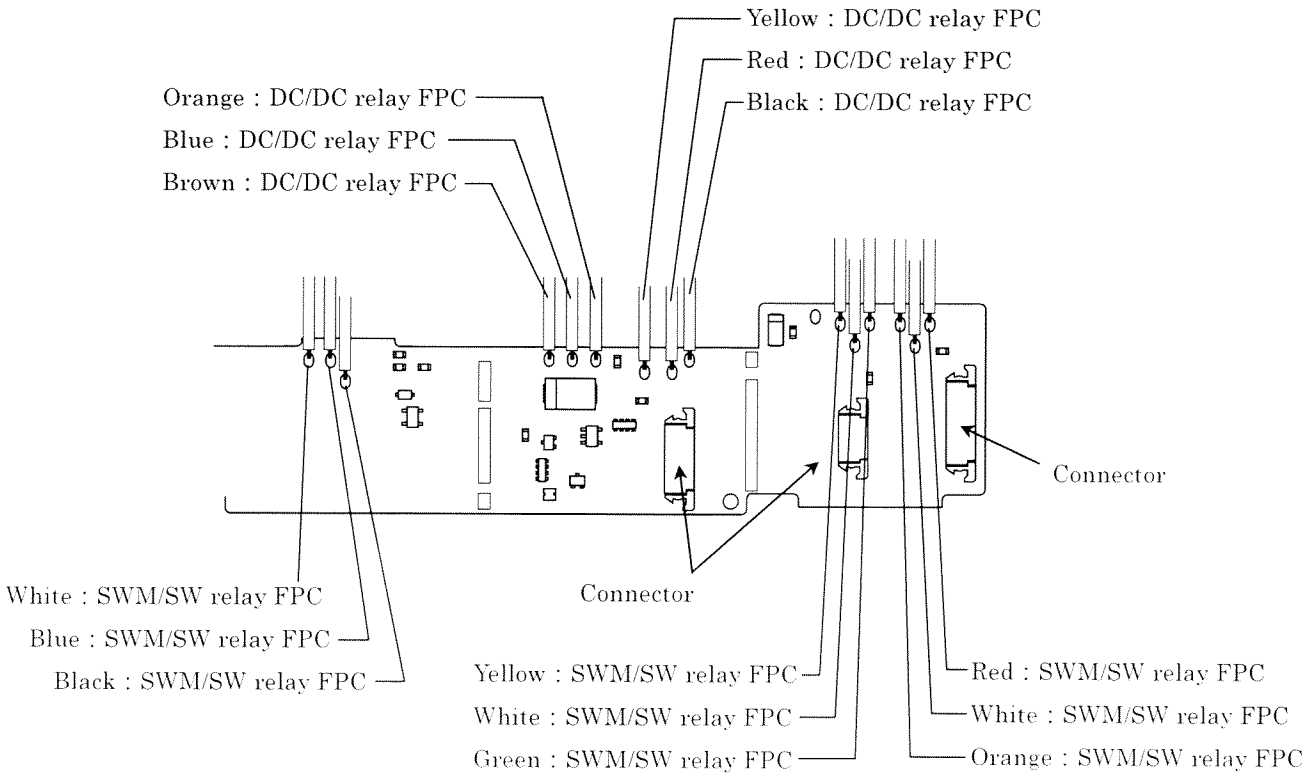


サービス計画課 M

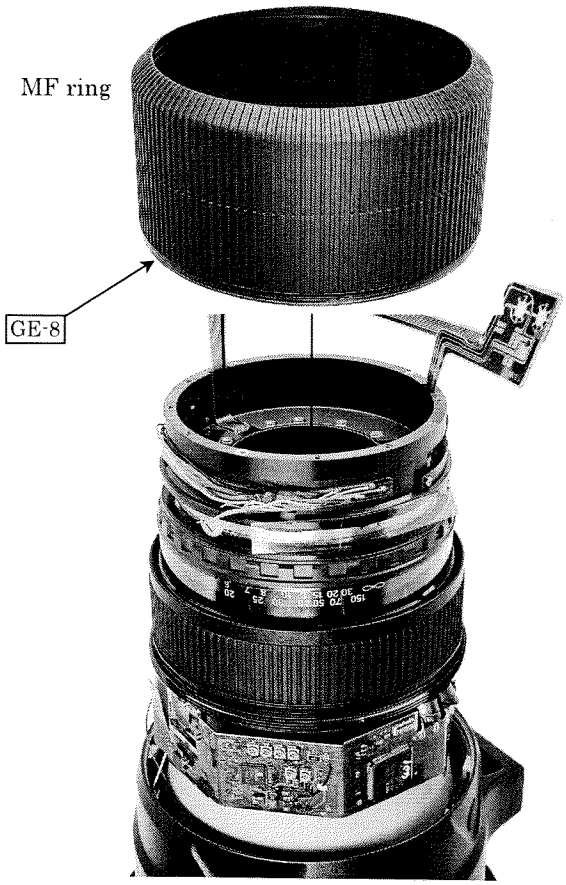
MAIN FPC



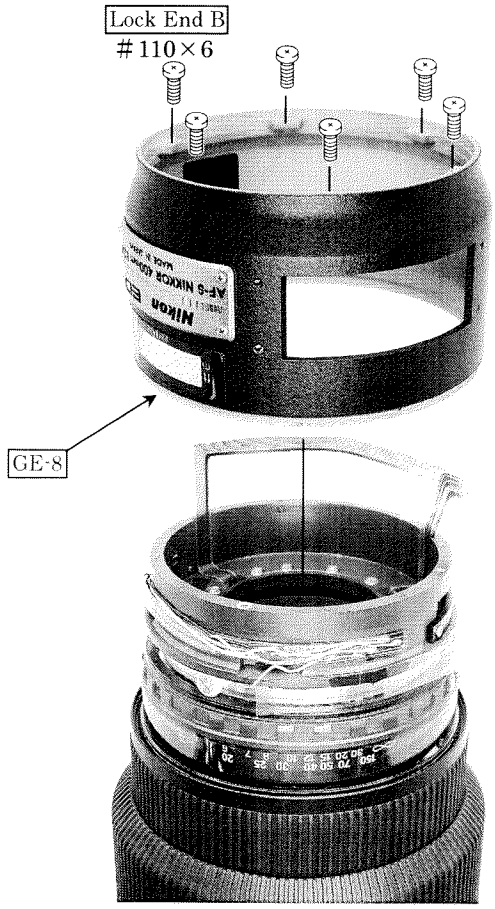
・Solder the cords and put the relay FPC in the 3 pieces of the connectors.


Yellow : DC/DC relay FPC
Red : DC/DC relay FPC
Black : DC/DC relay FPC
Orange : DC/DC relay FPC
Blue : DC/DC relay FPC
Brown : DC/DC relay FPC
Connector
White : SWM/SW relay FPC
Blue : SWM/SW relay FPC
Black : SWM/SW relay FPC
Connector
Yellow : SWM/SW relay FPC
White : SWM/SW relay FPC
Green : SWM/SW relay FPC
Red : SWM/SW relay FPC
White : SWM/SW relay FPC
Orange : SWM/SW relay FPC

MF RING



INDEX RING

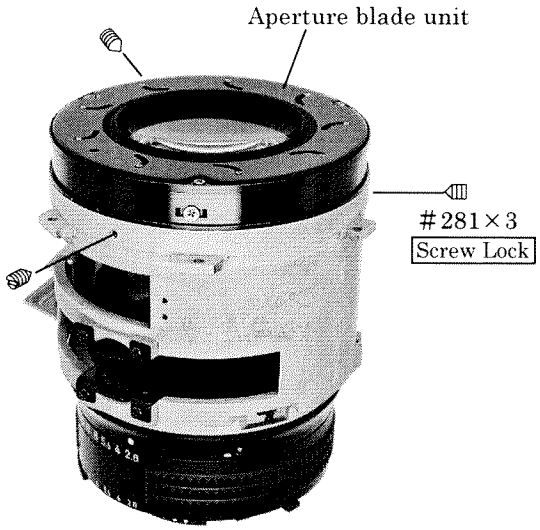


APERTURE DIAMETER ADJUSTMENT

①Adjust the diameter by loosening the screws #281×3 and moving the aperture blade. As a standard, set the maximum aperture(f/2.8) the same as the inside diameter of the arrow rack #33.(The inside diameter of the arrow #33 is almost the same as the reference inscribed circle diameter.)

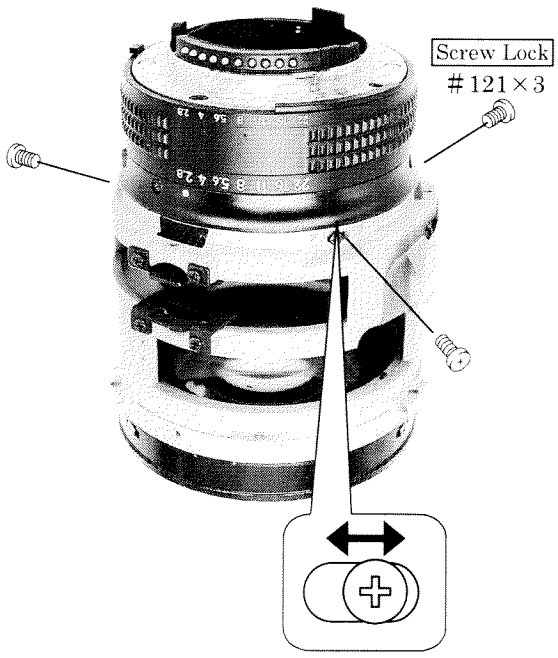
- The aperture diameter must be within the allowable range even if moving the aperture ring back and forth.
- The aperture diameter must be within the allowable range when the aperture lever is flipped by the finger and when it is not so.

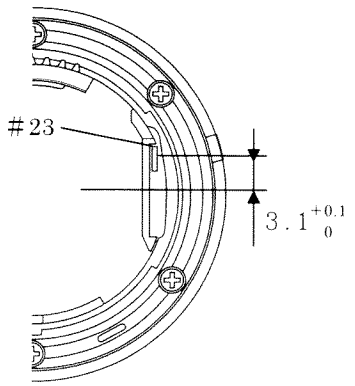
②After adjustment, fix the screws #281×3 with screw lock.



Aperture setting	Inscribed circle diameter (mm)	Allowable range (mm)
2.8	40.52	41.92～39.21
4	29.17	31.51～27.02
5.6	20.63	23.16～18.38
8	14.59	16.37～13.00
11	10.31	12.03～ 8.84
16	7.29	8.51～ 6.25
22	5.16	6.02～ 4.42

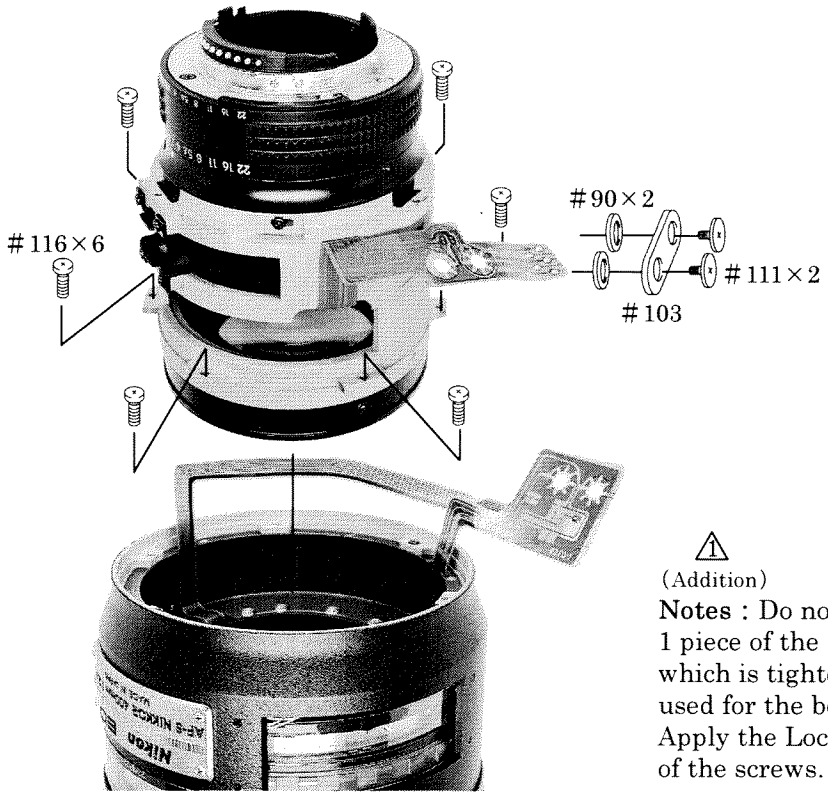
APERTURE LEVER POSITION ADJUSTMENT





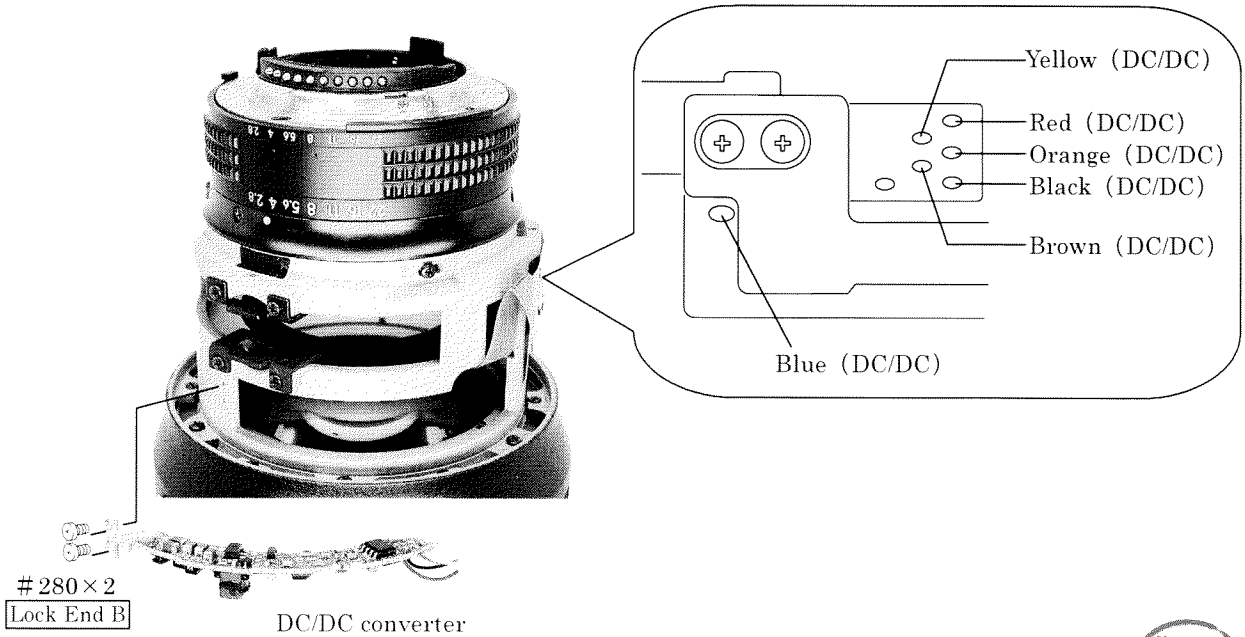
Adjust the position by loosening the screws #121×3. The aperture lever position must be within $3.1^{+0.1}_{0}$ to obtain the proper maximum aperture diameter.
At the same time, adjust the lateral position not to touch the bayonet mount and 3.1 lever protective pad.
After adjustment, fix the screws #121×3 with screw lock.

MOUNTING THE REAR GROUP



⚠1
(Addition)
Notes : Do not apply the adhesive to the 1 piece of the screws #116×6, which is tightened in the screw hole that is used for the body ground (not painted hole), Apply the Lock End B to the other 5 pieces of the screws.

DC/DC CONVERTER



サービス計画課 M

PREPARATION FOR ADJUSTMENT OF THE MAIN FPC

・In case of replacing the main FPC, the SWM unit, the MR encoder or the MR head, be sure to adjust the following items due to a necessity on the operation.

1. Items to adjust
   - ・Pulse from the MR encoder
   - ・Scanning speed checked from the driving frequency
   - ・Oscillation circuit
   - ・Motor control

2. Necessary equipment
   - ・single output rated voltage power supply : 1 to 3 unit(s)

     For contact A to mount : 5.0 to 5.5　100mA

     For contact F to contact G : 6.0V　3.0A

     In case of utilizing double output power supplies : 5.0V　2.0A

   - ・Multiple output rated voltage power supply : 1 unit for H8 D/A converter(for FV converter)

     In case of using the double output power sources　:±15.0V　300mA

     In case of using the triple output power sources　:±15.0V　300mA

     +5.0V　2.0A

   - ・H8 D/A converter J15334(as F/V converter) : 1 unit for adjusting the scanning speed
   - ・Oscilloscope : 1 unit for adjusting the pulse from the MR encoder, and for adjusting the scanning speed
   - ・Frequency counter : 1 unit for adjusting the scanning speed, and for adjusting the oscillation circuit
   - ・Communications tool J15353
   - ・Switching tool J15355

〈For your reference〉

Only 1 unit of the single output rated voltage power source is possible to supply current from the power source needed for adjustment.

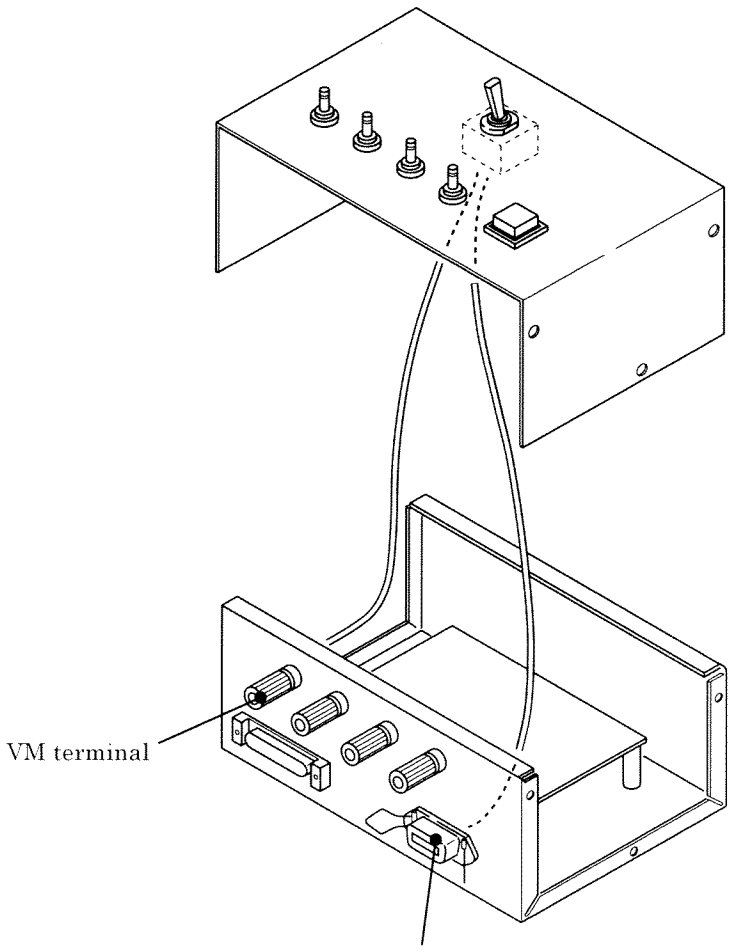
Then, its voltage value should be fixed to 5.0V.

Notes: In case of the presence of any defective conduction mode between the communications tool and the main FPC, corrosion or oxidation mode on the main FPC contact surface shall be conceivable.

Then, polish the contact surface and connect.

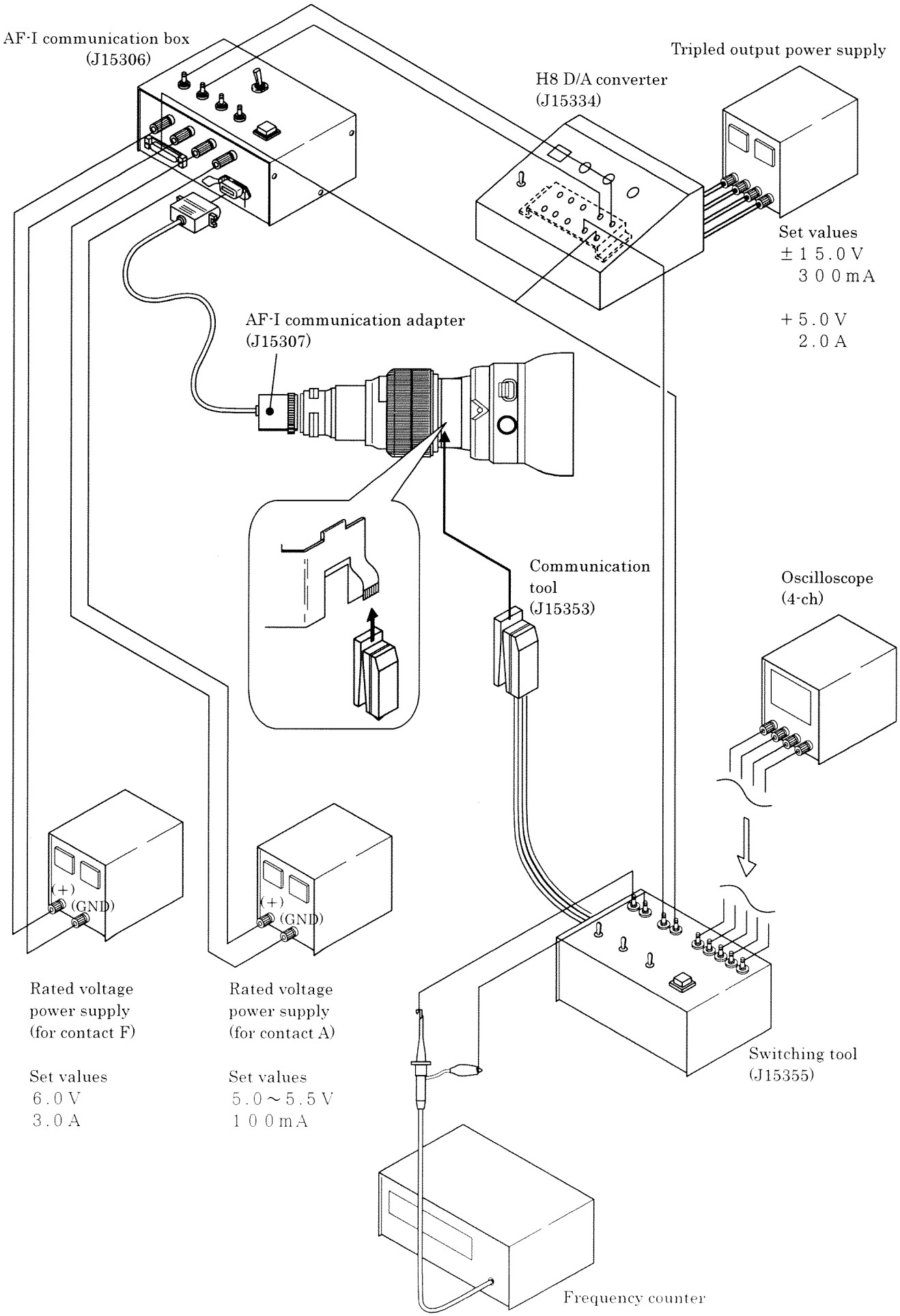
3. Preparation of the measuring lens

- As shown in the figure in the next page, arrange the connections between the rated voltage power supply, the measuring tools and the communication tool.
- Arrange the connections with the AF-S lens inspection system.
  In case the DC-DC converter is already connected in the AF-I communications box, the rated voltage power supply for contact A is not necessary.
- In case of measuring this AF-S lens, the AF-I communications box needs to be remodeled as shown in the figure below.



- Connect the toggle switch with the somewhere between the VM terminal and the 1 pin, or the contact F, on lens connector.
  Then, perform wiring.

- In order to set the lens driving mode selector switch to M/A and FULL, connect the [White] and [Orange] wires, [White] and [Yellow] wires respectively, which are to be soldered to the change-over switch.


AF-I communication box
(J15306)
Tripled output power supply
H8 D/A converter
(J15334)
Set values
±15.0V
300mA
+5.0V
2.0A
AF-I communication adapter
(J15307)
Communication
tool
(J15353)
Oscilloscope
(4-ch)
(+)
(GND)
(+)
(GND)
Rated voltage
power supply
(for contact F)
Set values
6.0V
3.0A
Rated voltage
power supply
(for contact A)
Set values
5.0～5.5V
100mA
Switching tool
(J15355)
Frequency counter

PULSE ADJUSTMENT FOR THE MR ENCODER

・In case of replacing the MR encoder or the MR head, be sure to adjust the pulse.

How to adjust

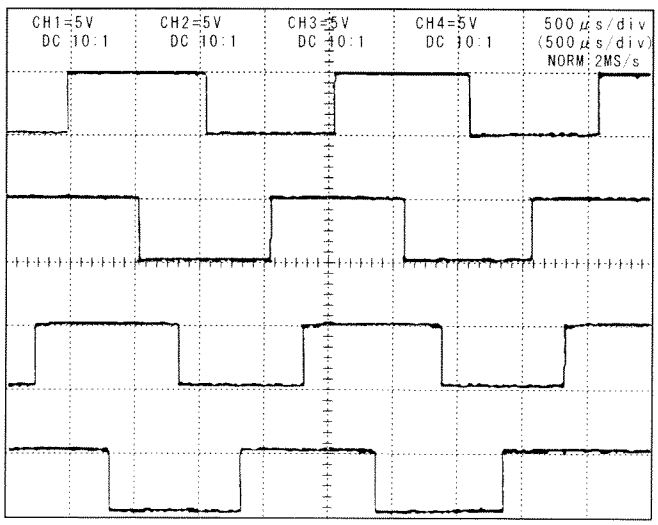
①On the switching tool, turn on the switch 1, turn off the switch 2 and turn on the switch 3.

②Check whether the arranged numerical value for connecting each current and voltage is adequate or not.
Then, turn on the rated voltage power supply each for the contact A and the contact F.

③Select the item of "The main FPC adjustment" from the menu in the AF-S tele lens inspection program.
Then, set the mode ready for the adjustment.

④Turn on the remodeled switch on the AF-I communications box.
Then, the lens automatically starts the scanning operation.

⑤Stop the pulse from the oscilloscope by operating 'START/STOP' key.
Then, the quantity of width between H and L should be two to three blocks.

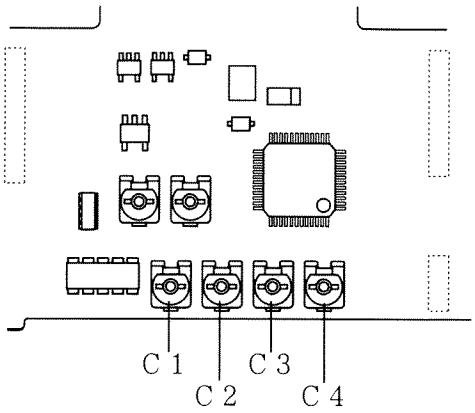


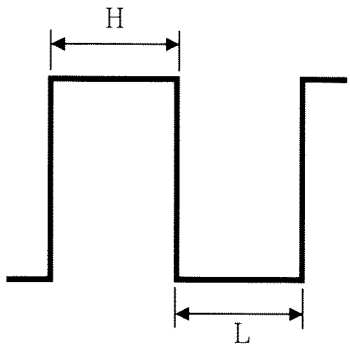
●Setting of oscilloscope

V／Div (CH1)	: 5 V
V／Div (CH2)	: 5 V
V／Div (CH3)	: 5 V
V／Div (CH4)	: 5 V
Coupling	: D C
Time／Div	: 500μsec
Trigger Mode	: A U T O
Trigger Coupling	: D C
Trigger Source	: C H 1
Trigger position	: － 4 div
Trigger Type	: ⌐
Trigger Lever	: 2.5 V

⑥Adjust the ratio between H and L in each CH 1 to CH 4 by VR, variable resistor.

Standard H:L=9:10~10:9





CH 1 : VR for C1

to

CH 4 : VR for C4

In the case of longer H : Drive the VR clockwise.

In the case of longer L : Drive the VR anticlockwise.

Notes: In the impossible case of adjusting it by the VR, replace the MR encoder or the MR head.

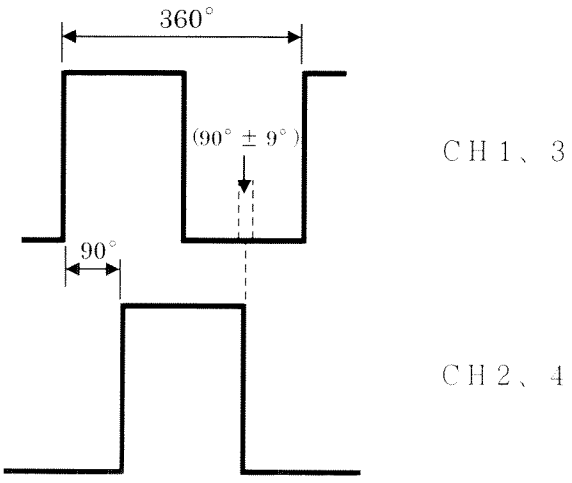
⑦After adjusting the width ratio between H and L, as shown in the figure below, check that CH 1 goes horizontally 90-degree earlier than CH 2.

Besides, confirm that this phenomenon also applies for the case between CH 3 and CH 4.

Standard within 90° ± 9°

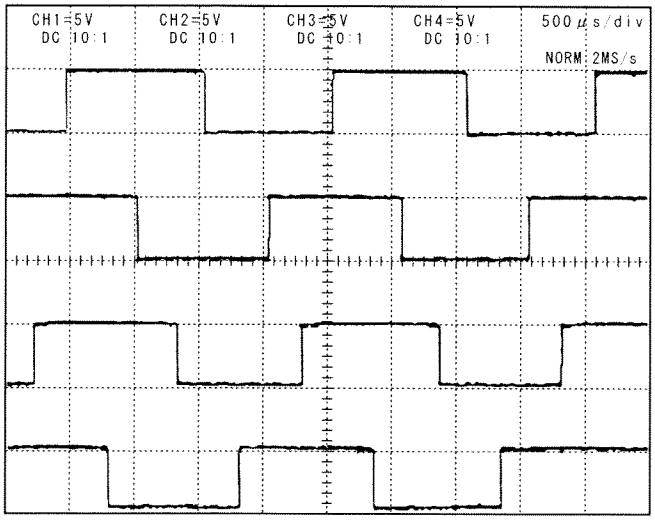
Notes: In case the focus index ring drives from the closest position to the infinity, the CH 2 and 4 horizontally advance in 90° against the CH 1 and 3.

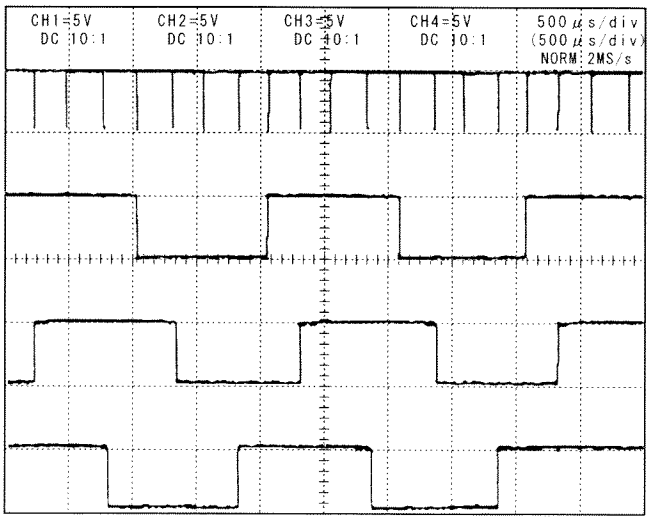
Besides, just in the out-of-standard case, replace the MR encoder or the MR head.



⑧Press the switch 4 of switching tool.

⑨Stop the oscilloscope CH 1's pulse by operating the 'START/STOP' key and then check there are equal intervals among them.





●**Setting of oscilloscope**
Change only the Trigger Mode
To SGL〔S〕

⑩Turn of the remodeled switch on the AF-I communications box.
Then, escape from the adjustment-available mode in the AF-S tele lens inspection program.

⑪Turn of the arranged voltage power supply.

ADJUSTMENT FOR SCANNING SPEED/INSPECTION FOR DRIVING FREQUENCY

・This adjustment is made for calculating the adjusted frequency value for the oscillation circuit adjustment.
In this accord, be sure to adjust it when replacing either the main FPC, the SWM unit. the MR encoder or the MR head.

①For how to connect the rated voltage power supply with the measuring tools, follow the same procedures with 'Pulse adjustment for the MR encoder'.

②Check whether or not both current and voltage from the rated voltage power supply are the same with the set values.

③Set the switch of the H8 D/A converter in accordance with the conditions below, and then turn on the triple output power source.
Rotary switch : Frequency, UP, 10KHz, 20m sec., 2K
Toggle switch : Open
ＩＮＡ : Connect INA with the terminal H on AF-I communications box.
ＩＮＢ : Connect INB with the terminal E on AF-I communications box.
ＧＮＤ : Connect GND with both the AF-I communications box' terminal GND and the switching tool's terminal GND.
Ｄ／Ａ : Connect the D/A with the terminal D/A on switching tool.

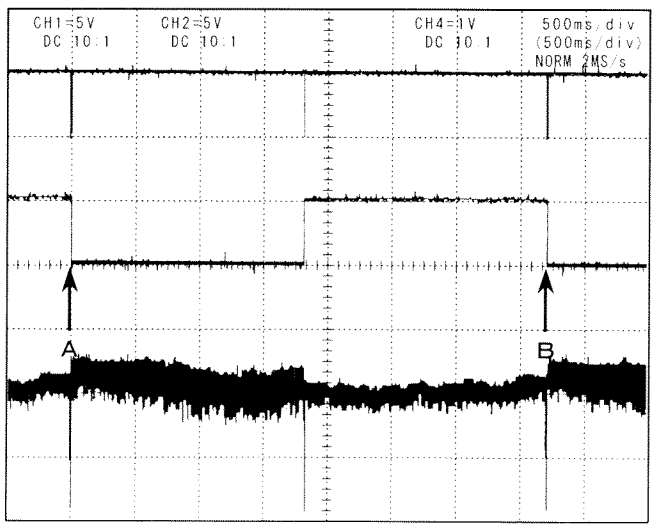
④On the switching tool, turn on the switch 1 and turn off the switch 2 and 3.

⑤Turn on the arranged voltage power supply for the contact A and the contact F.
Notes: In case the ampere meter index widely swings, immediately turn off the power supply. This mode shows the dangerous and critical condition caused by the circuit in short condition.

⑥Select the item of "Main FPC adjustment" in the AF-S tele lens inspection program menu. Then, set the mode ready for adjustment.

⑦Turn on the remodeled switch on the AF-I communications box.
Then, the lens automatically starts the scanning operation.

⑧Using the oscilloscope, measure both the scanning time CH 2 and D/A output CH 4 from the H8 D/A converter.



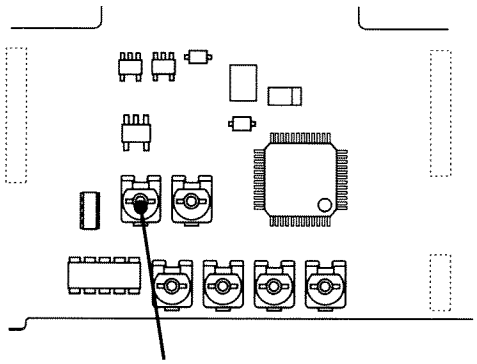
●Setting of oscilloscope

V／Div (CH1)	: 5 V
V／Div (CH2)	: 5 V
V／Div (CH3)	: ＯＦＦ
V／Div (CH4)	: 1 V
Coupling	: ＤＣ
Time／Div	: 500msec
Trigger Mode	: NORMAL
Trigger Coupling	: ＤＣ
Trigger Source	: ＣＨ１
Trigger position	: － 4 div
Trigger Type	: ⌐↑
Trigger Lever	: 2.5 V

⑨Using the VR 52, adjust the scanning speed which is created between the pulse A and B in the oscilloscope CH 2.

The numerical value of scanning speed: 3.8±0.1sec(10±0. 3rpm)

〔Main FPC〕



VR52 (Adjusting the scanning speed)

⑩Check whether there is any irregular scanning mode in the oscilloscope CH 4's pulse or not.

The pulse to be checked : Whole pulse except the one(s) dropping around to 0V.

Referable value : The difference between max. and min. should be less than 1V.

Notes: In case of any conspicuous difference(s) among the pulses, there is a possibility of any mechanical failure in the MR encoder or the MR head.

⑪After adjusting the scanning speed, take a record of the driving frequency which is a measured value on the frequency counter.

In case there is a HOLD function on the frequency counter, to hold the displayed measured value shall be recommendable for your further convenience.

⑫After turning off the remodeled switch in the AF-I communications box, escape from the adjustment - available mode in the AF-S tele lens inspection program.

⑬Turn off the switch 1 on switching tool.

⑭Select the item of "Check for driving frequency" from the AF-S tele lens inspection program menu.

⑮Follow the instructions on PC screen and check the temperature coefficient.

Then, input the driving frequency value which was recorded in the column above.

Accordingly, both the high and low frequency values from the adjusted frequency range are displayed.

Notes: While displaying the inspection program, adjust the oscillation circuit.

⑯Turn off the triple output power supply of the H8 D/A converter.

ADJUSTMENT FOR THE OSCILLATION CIRCUIT

・This adjustment is made for the frequency which drives the SWM.
Be sure to perform after adjusting the scanning speed.
Notes: Continuously adjust the oscillation circuit after adjusting the scanning speed.

①For how to connect the rated voltage power supply with the measuring tools, follow the same procedures with 'Adjustment for scanning speed'.

②On the switching tool, turn off the switch 1, turn on the switch 2 and turn off switch 3.

③Check whether each current and voltage value from the connecting voltage power supply is set-up value or not.
Then, turn on the rated voltage power supply for the contact A and the contact F.
Notes: In case the ampere meter index widely swings, immediately turn off the power supply. This mode shows the risky and critical condition caused by the circuit in short condition.

④Turn on the remodeled switch in the AF-I communications box.

⑤For checking the driving frequency, select the item of "2. Adjustment of oscillation circuit" in the displayed adjusted frequency value on PC screen, and then set the mode ready for adjustment.

⑥Check whether the displayed value on the frequency counter is around 124 KHz or not.
Notes: In any irregular value mode case on the display, reconfirm each arrangement mode for the rated voltage power supply and for each switch, and then go to the inspection mode again. In case what is displayed still shows any irregularity even after doing the procedures above, once again try the processes from⑬ in the former page, L29.

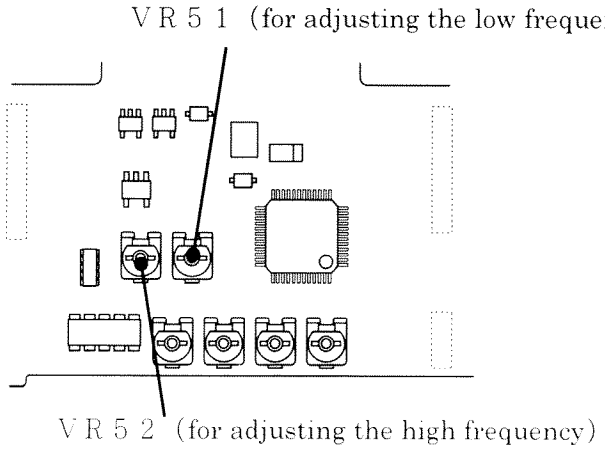
⑦Turn of the switch 2 on the switching tool.
Check the displayed value on the frequency counter is around 108 KHz.

⑧Check the both high and low frequency values from the adjusted frequency range on PC screen.

⑨Turn on the switch 2 on the switching tool. Then, using the semi-fixed resistor VR52, adjust the high frequency-sided frequency value.

⑩Turn off the switch 2 on the switching tool.
Then, using the semi-fixed resistor VR51, adjust the low frequency-sided frequency value.

〔Main FPC〕



⑪Turn off the remodeled switch in the AF-I communications box.
Then, escape from the adjustment-available mode in the AF-S tele lens inspection program.

⑫Turn off the rated voltage power supply for the contact F and the contact A.

WRITE DATA IN EEPROM

・When replacing the main FPC, it is necessary to write the fixed value data in EEPROM.
This lens doe not have the aberration compensation data.

【Follow the procedures below for writing the fixed value】

①Connect everything with each other for the inspection system for AF-S lens.
It is possible to conduct adjustment as the oscillation circuit is connected for adjustment.
Then, do not use the switch tool, the H8 D/A converter and so.

②Select 'READING AND REWRITING THE EEPROM DATA' from the menu items of the inspection program for AF-S tele lens.

③Write the fixed value.

ADJUSTMENT FOR MOTOR CONTROL

・In order to further optimize the SWM's initial driving, this adjustment should be conducted.
Accordingly, after adjusting the oscillation circuit, be sure to conduct the adjustment.
Notes: During adjustment, be sure to keep the lens flat.
In the case of replacing the main FPC, if not writing the fixed value in EEPROM, the adjustment cannot be done normally.
In this accord, be sure to write the data prior to the regular adjustment.

①Connect everything with each other as the inspection system for the AF-S lens.
Although it is possible to conduct adjustment in the already arranged connection for adjusting the oscillation circuit, some of equipment such as the switch tool, the H8 D/A converter or so are not necessary then for its operation.

②Ensure that each set value is actually applied to both current and voltage for the rated voltage power supply.
Then, turn on the rated voltage power supply for both contacts A and F.
Notes: In case the current meter's hand widely swings, due to electrically short condition in the Circuit, be sure to immediately turn off the power supply.

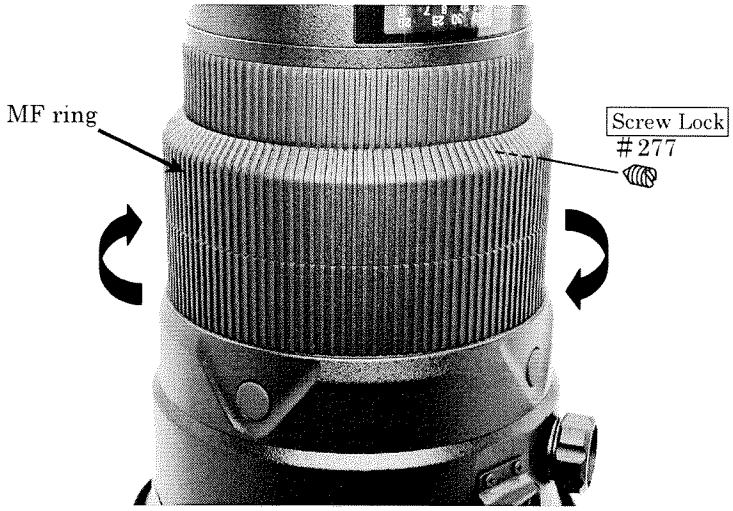
③Select 'ADJUSTMENT FOR MOTOR CONTROL' from the menu items in the inspection program for AF-S tele lens, and then conduct adjustment.

④Turn off the rated voltage power supply for both contacts A and F.

HOW TO MANAGE AFTER ADJUSTING THE MAIN FPC

・Remove the communication tool, and then apply a tape TA-0001 on the FPC communications contact for protection.

MF RING

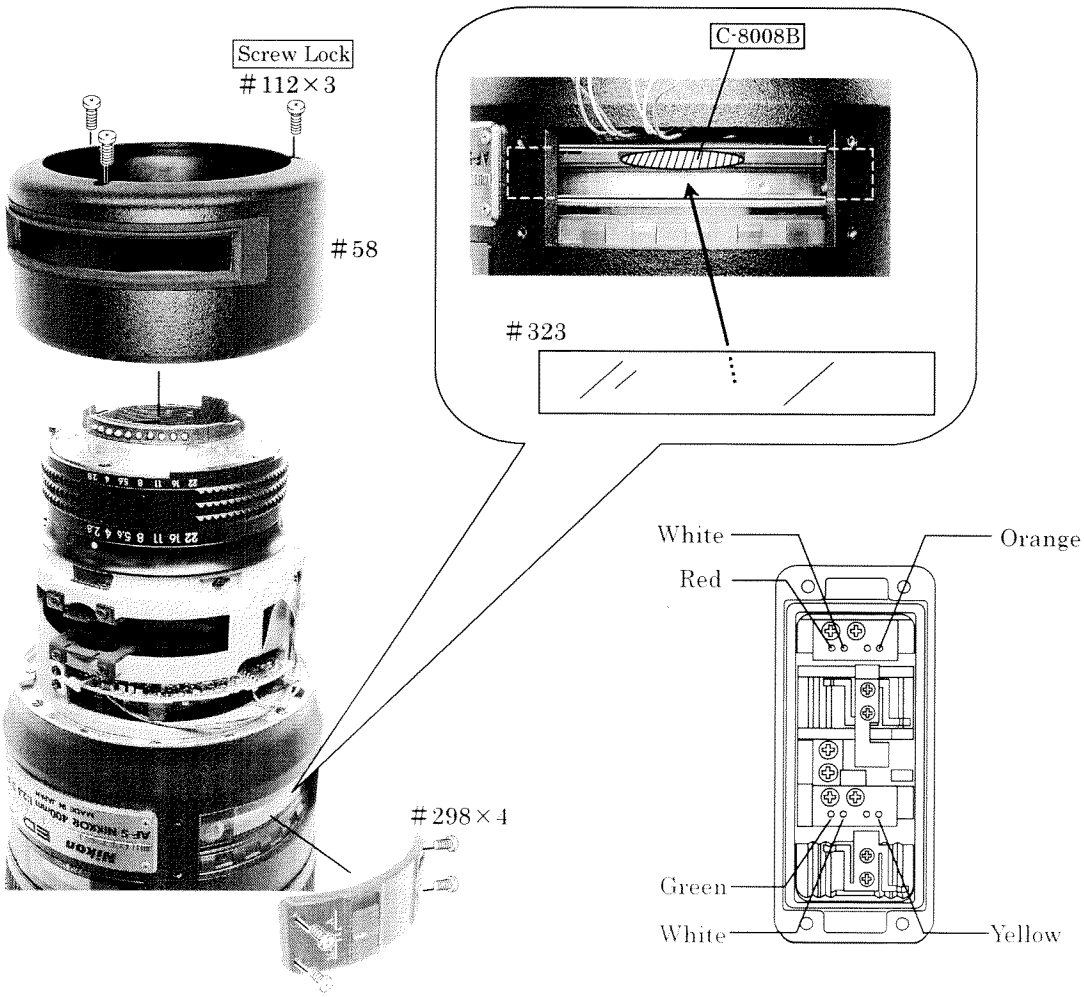


・Rotate the MF ring in an arrow direction and set it.
Then fix it by the screw #277.

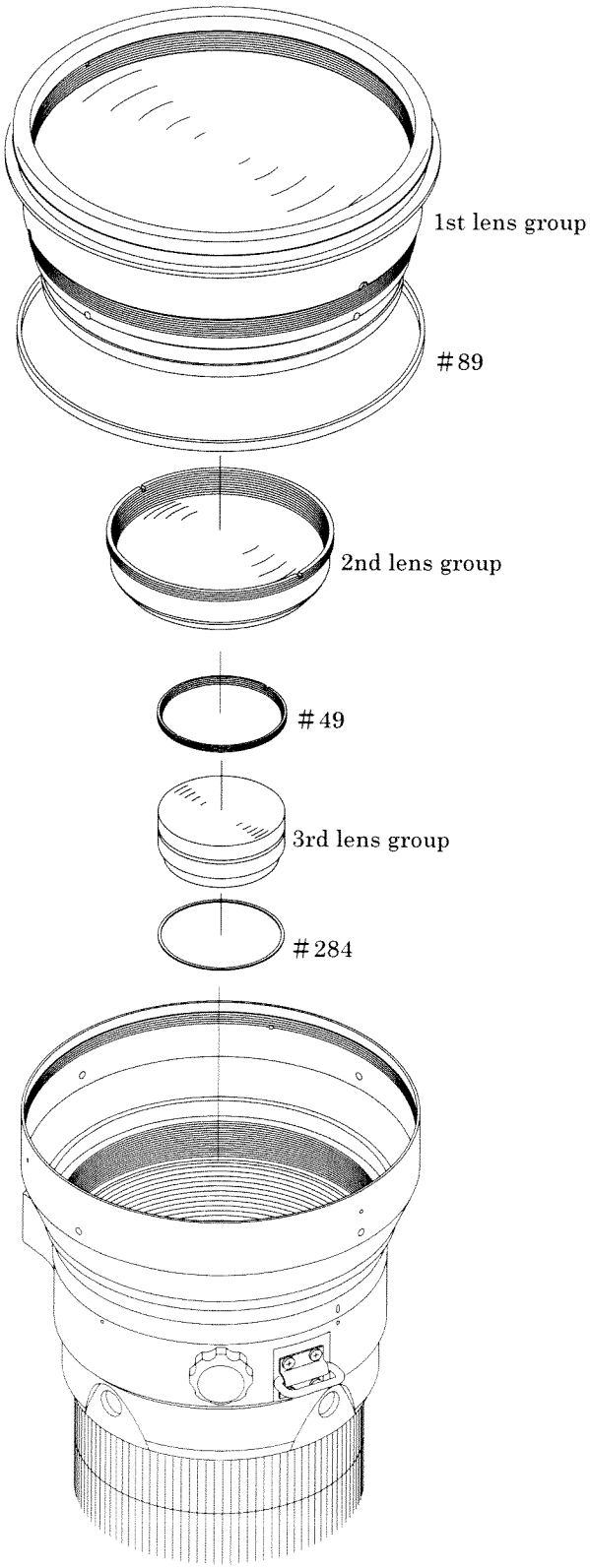
CHECK OF THE MF RING ROTATION DRIVE

①If the MF ring does not rotate smoothly when rotating it, loosen the 4 pieces of the screws #67 fixing the AF lock ring.
Then tighten the 4 pieces of the screws again so that the MF ring may rotate smoothly.
(Refer to page L11.)
②Fix the 4 pieces of the screws #67 with screw lock.

REAR HOUSING, CHANG-CVER SWITCH UNIT



1st～3rd LENS GROUP



ADJUSTMENT AND CHECK FOR F.F.D.(BACK FOCUS), "∞"ALIGNMENT

①Set the focus ring to "∞" and the aperture to "maximum(f2.8)".

②Read the M.B.f. value and check if it is within the standards.

③When the M.B.f. value is out of standard, remove the 1st, 2nd and 3rd lens groups and then adjust the difference between the standard and the read value by using the washer#284 of the 3rd lens group.

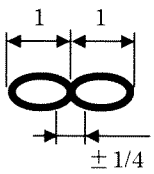
When the difference is positive : Thicken the washer.

When the difference is negative : Thin the washer.

Standard: 0±0.25mm

④When the M.B.f. value is within the standard, check the "∞" alignment with a collimater.

Standard: ±1／4 of "∞"



・If the F.F.D adjustment is impossible, adjust the "∞" alignment in the same way.

LENS OPERATION CHECK

Refer to the page L38 to L47 in the repair manual for AF-S80-200/2.8D(JAA76551) and check the operational conditions.

In addition what is displayed on PC screen is slightly different from the statements in check list.

The followings are the tolerances for standards.

(2) Image of "operation of MR encoder"

```
TYPE OF LENS : AF-S NIKKOR 400mm/2.8D II                CPU VERSION : 1.00.00
OPERATION OF MR ENCODER

POSITION WHEN CHECK BEGINS [PULSE (S)] ..... 2
POSITION WHEN CHECK IS ENDED [PULSE (S)] ..... 3
PULSE NUMBER DIFFERENCE BEFORE/AFTER CHECK. [PULSE (S)] ..... 1
STANDARD FOR DIFFERENCE IN NUMBER PULSE  -10 TO 10  [PULSE (S)]
                                                        IN STANDARD.
**************************************************
THE TOTAL NUMBER OF PULSE(S) AT INSPECTION [PULSE (S)] ..... 16334
STANDARD FOR THE NUMBER : 16123  TO  16702  [PULSE (S)]
                                                        IN STANDARD.



PUSH ESC KEY TO RETURN TO MENU.
```

(3) Image of "lens driving stop accuracy"

```
TYPE OF LENS : AF-S NIKKOR 400mm/2.8D II                CPU VERSION : 1.00.00
INSPECTION OF DRIVING STOP ACCURACY.
①→NUMBER OF LENS GO-AND-RETURN OPERATIONS.                    :      5/5 TIME(S).
NUMBER OF LENS DRIVING TIMES (DF0+DF1+DF2+DF3+DF4+DF5+DF6)    :      444 TIME(S).
MAXMUM PULSEABS. (VALUE) (DF0+DF1+DF2+DF3+DF4+DF5+DF6)        :       12 PULSE(S).
OVER (OR UNDER) RUN PULSE(S).                                 :        3 PULSE(S).
LENS DRIVING TIME   :  DF1=76  DF2=75  DF3=74  DF4=73  DF5=70  DF6=66
DIRECTION           :        INF → CLOSE              CLOSE → INF
AMOUNT              :    DF1     DF2     DF3        DF1     DF2     DF3
UNDER(-), OVER(+)   :  (-)(+)  (-)(+)  (-)(+)     (-)(+)  (-)(+)  (-)(+)
      0 - 9         :  38  0   38  0   37  0       0  38   0  37   0  37
     10 - 27        :   0  0    0  0    0  0       0   0   0   0   0   0
     19 - 27        :   0  0    0  0    0  0       0   0   0   0   0   0
④→    28 -          :   0  0    0  0    0  0       0   0   0   0   0   0
DIRECTION           :        INF → CLOSE              CLOSE → INF
AMOUNT              :    DF4     DF5     DF6        DF4     DF5     DF6
UNDER(-), OVER(+)   :  (-)(+)  (-)(+)  (-)(+)     (-)(+)  (-)(+)  (-)(+)
      0 - 9         :  37  0   35  0   33  0       0  36   0  35   0  33
     10 - 27        :   0  0    0  0    0  0       0   0   0   0   0   0
     19 - 27        :   0  0    0  0    0  0       0   0   0   0   0   0
⑤→    28 -          :   0  0    0  0    0  0       0   0   0   0   0   0
②→  RATIO (1)  (%)  : Df1=0.00  Df2=0.00  Df3=0.00  Df4=0.00  Df5=0.00  Df6=0.00
③→  RATIO (2)  (%)  : Df1=0.00  Df2=0.00  Df3=0.00  Df4=0.00  Df5=0.00  Df6=0.00
PUSH ESC KEY TO RETURN TO MENU.
```

Note : If the MF ring is rotated during lens scanning, an error value is shown for the pulses.
Don't touch the MF ring during operation.
The above image is displayed during lens scanning. Execute inspection for the 5 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 90° upward	
Front group 90° downward	

The pulses of overrun／underrun must be within the standards after the lenses have reciprocated five times ("5／5 TIME(S). in ① of the image").

Standards RATIO(1) is 40% or less for Df1～Df6 ——— ② of the image
(Occurrence ratio of 10～27 pulses)

RATIO(2) is 10% or less for Df1～Df6 ——— ③ of the image
(Occurrence ratio of 19～27 pulses)

Occurrence of 28 or more pulses is 0 for Df1～Df6 ——— ④ and ⑤ of the image
(It is malfunction if there is only one occurrence.)

※Df1～Df6 shown the lens driving amount.

(4) Image of "lens servo time"

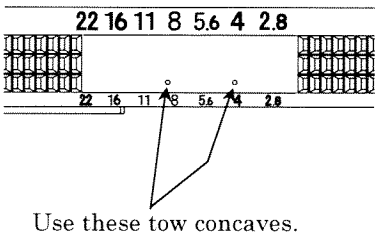
TYPE OF LENS : AF-S NIKKOR 400mm/2.8D II CPU VERSION : 1.00.00
INSPECTION OF LENS SERVO TIME.

SERVO AMOUNT	STANDARD
1. [Df1]	35ms OR LESS.
2. [Df2]	45ms OR LESS.
3. [Df3]	54ms OR LESS.
4. [Df4]	66ms OR LESS.
5. [Df5]	83ms OR LESS.
6. [Df6]	95ms OR LESS.

7. DRIVE TO INFINITY.
8. DRIVE TO CLOSE.

SELECT A NUMBER.
PUSH ESC KEY TO MENU.

MOUNTING THE COUPLING CLAW



Use these tow concaves.

①Remove the aperture ring28.
②Make holes (ϕ1.1) at the two concaves of the aperture ring.
③Mount the coupling claw.

Coupling claw	1K406－029	×1
Screw	1K010－002－1	×2

④Assemble the components.

When replacing a part listed below, Some adjustment may be required

Parts Replaced / Item of Adjustment	MR SENSOR UNIT	FOCUS FIXED UNIT	SWM UNIT	MAIN FPC
Inspection and Adjustment for the Waveform output from MR encoder	○	○		
Pulse adjustment for the MR encoder	○	○		○
Adjustment for Scanning speed	○	○	○	○
Adjustment for the oscillation circuit	○	○	○	○
Write data in EEPROM	○	○	○	○
Adjustment for motor control	○	○	○	○

【Special setting of RP No. for glass parts according to the lens design frequency】

There is lens design frequency for AF-S400/2.8D II (JAA52551) .When replacing a glass part, check the special setting of RP No. and then request a part of the same design frequency.

Notes: The part numbers of the glass parts are the same as AF-S400/2.8D (JAA52451). However, since the design frequency is set every product code, even the part number and the design frequency are the same, the material of glass is different and they are not interchangeable. Therefore, the parts for AF-S400/2.8D II (JAA52551) has [-1] at the end of the part number for identification.

RP No.

1 G◎◎◎－◎◎◎－△□ or 1 B◎◎◎－◎◎◎－△□

Example) 1 G 1 1 7 － 0 5 5 － 0 C － 1

- 1 G 1 1 7 － 0 5 5 : G2 lens
- 0 : Initial figure
- C : 3rd lens design
- 1 : Special part for AF-S400/2.8D II (JAA52551)

◎: Conventional figure number

△: Figure correction frequency (Numeral)

□: Lens design frequency (Alphabet)

Notes: Alphabets are used for distinction of the lens design frequency. The meaning of a capital letter is different from that of a small letter. Request a part correctly.

Meaning of △	
0	Initial figure
1	1st figure correction
2	2nd figure correction
3	3rd figure correction
4	4th figure correction
5	5th figure correction
・	・
・	・
・	・
・	・
・	・
・	・
・	・
・	・

Meaning of □	
A	1st lens design
B	2nd lens design
C	3rd lens design
・	・
・	・
・	・
Z	26 th lens design
a	27th lens design
b	28th lens design
c	29th lens design
・	・
・	・
・	・
z	52nd lens design

(For "a" and after, small alphabet letters are used.)

TOOLS

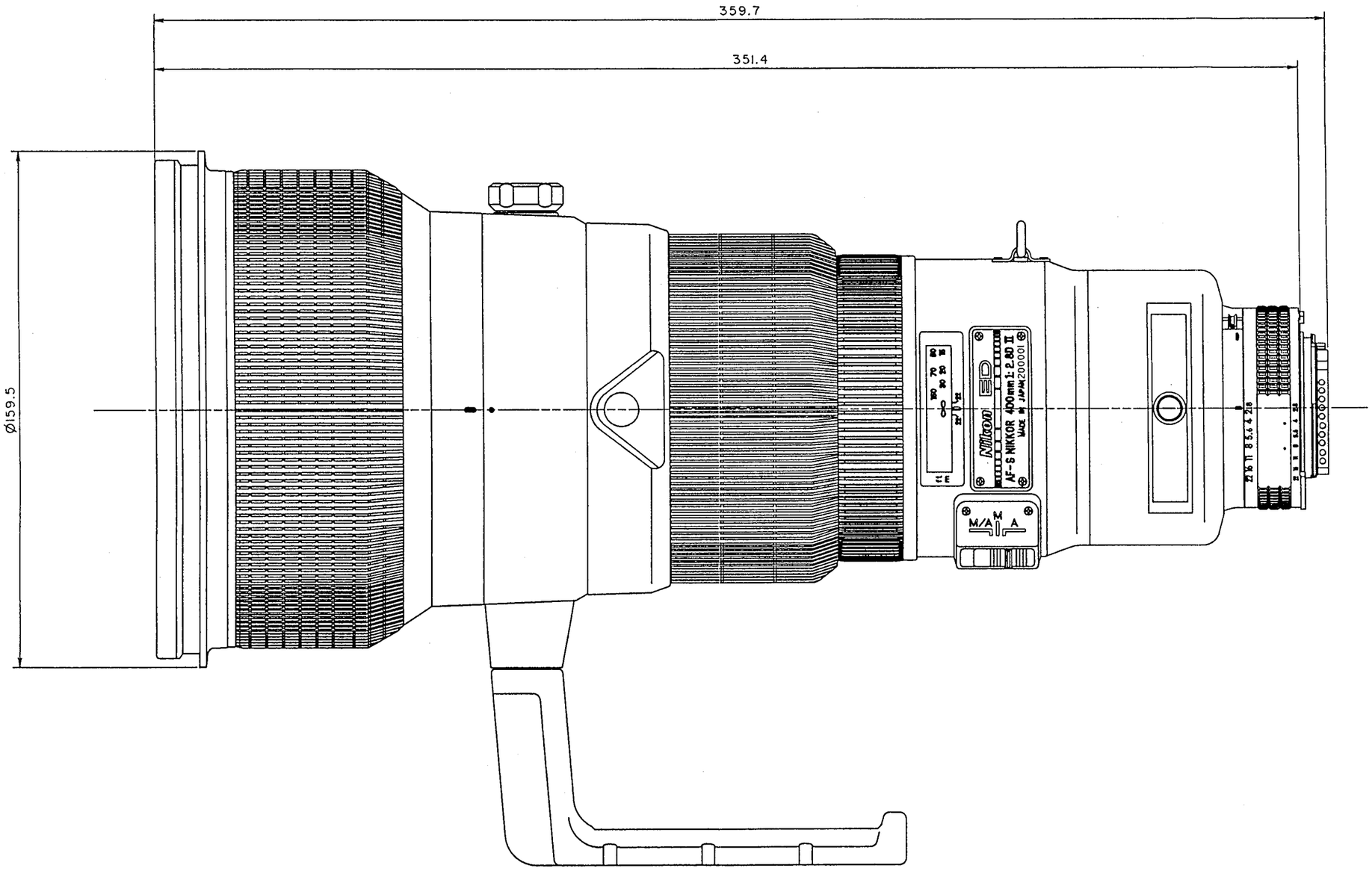
1. Measuring instruments (Main)

Tool No.	Name	Remarks
J15306	AF-I Communication box	The tool used for AF-I is used again
J15307	AF-I Communication adapter	The tool used for AF-I is used again
J15334	H8 D/A converter (F/V converter)	For adjusting the scanning speed
J15352	Communication tool	Used for inspection and adjustment for output from the MR encoder
J15353	Communication tool	For adjustment the Main FPC
J15355	Switching tool	For adjustment the Main FPC
J18323	AF-S TELE LENS Inspection and adjustment software	IBM 3.5-inch

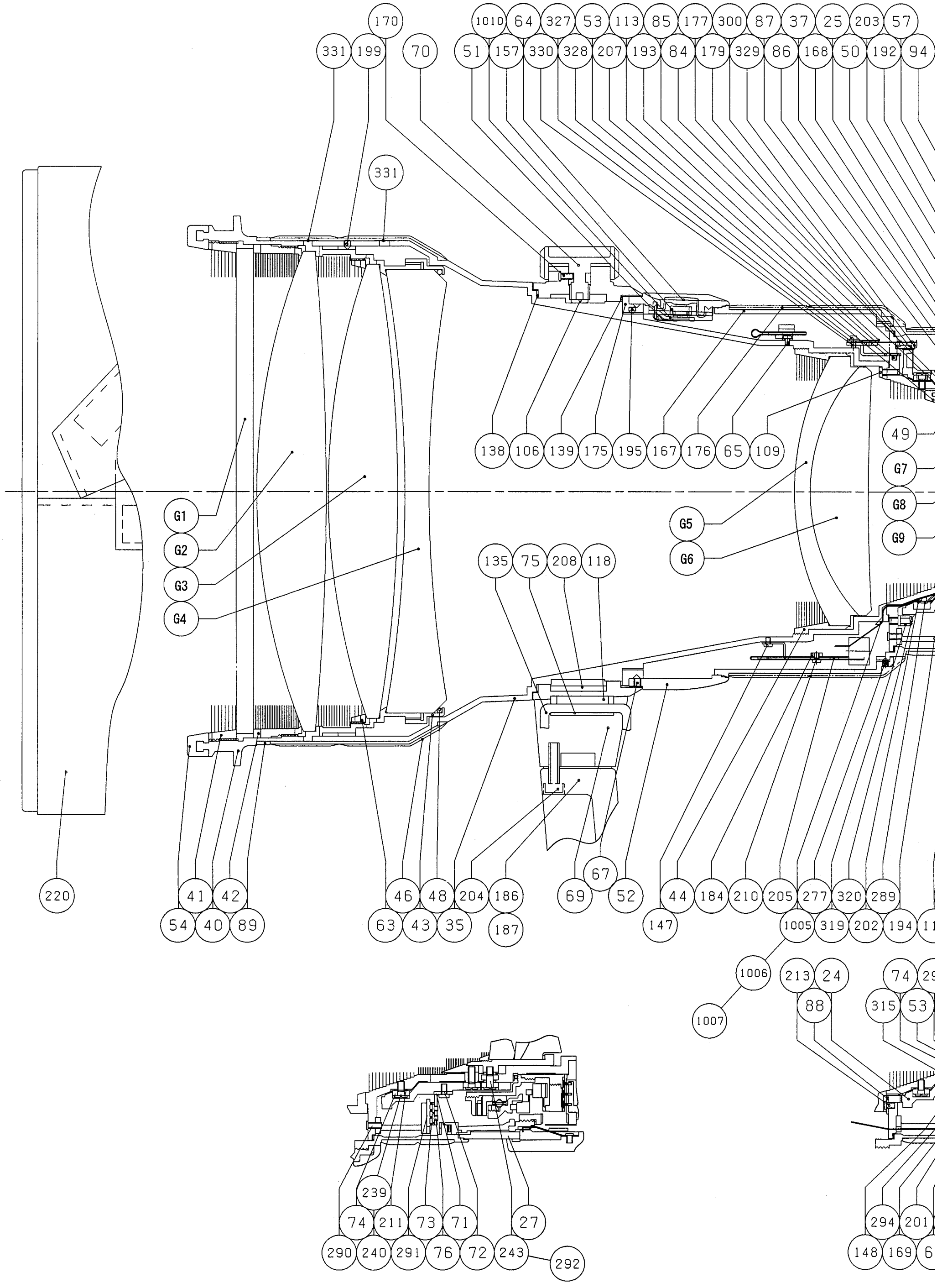
2. Hand-made tool

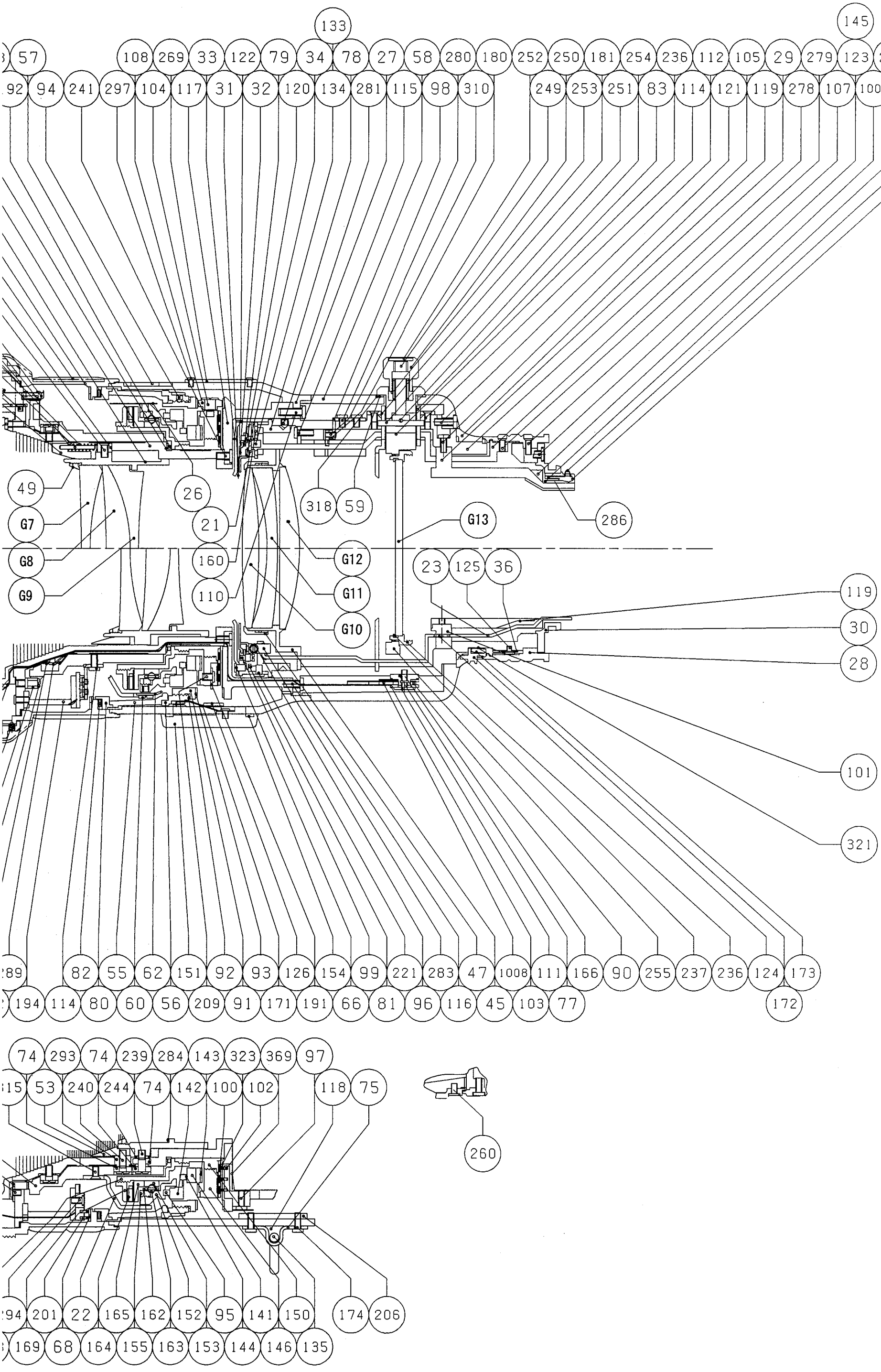
	Name	Remarks
Tool	SWM rotation actuating tool	The tool used for AF-S 300/2.8 is used again

外観図 Sketch drawings



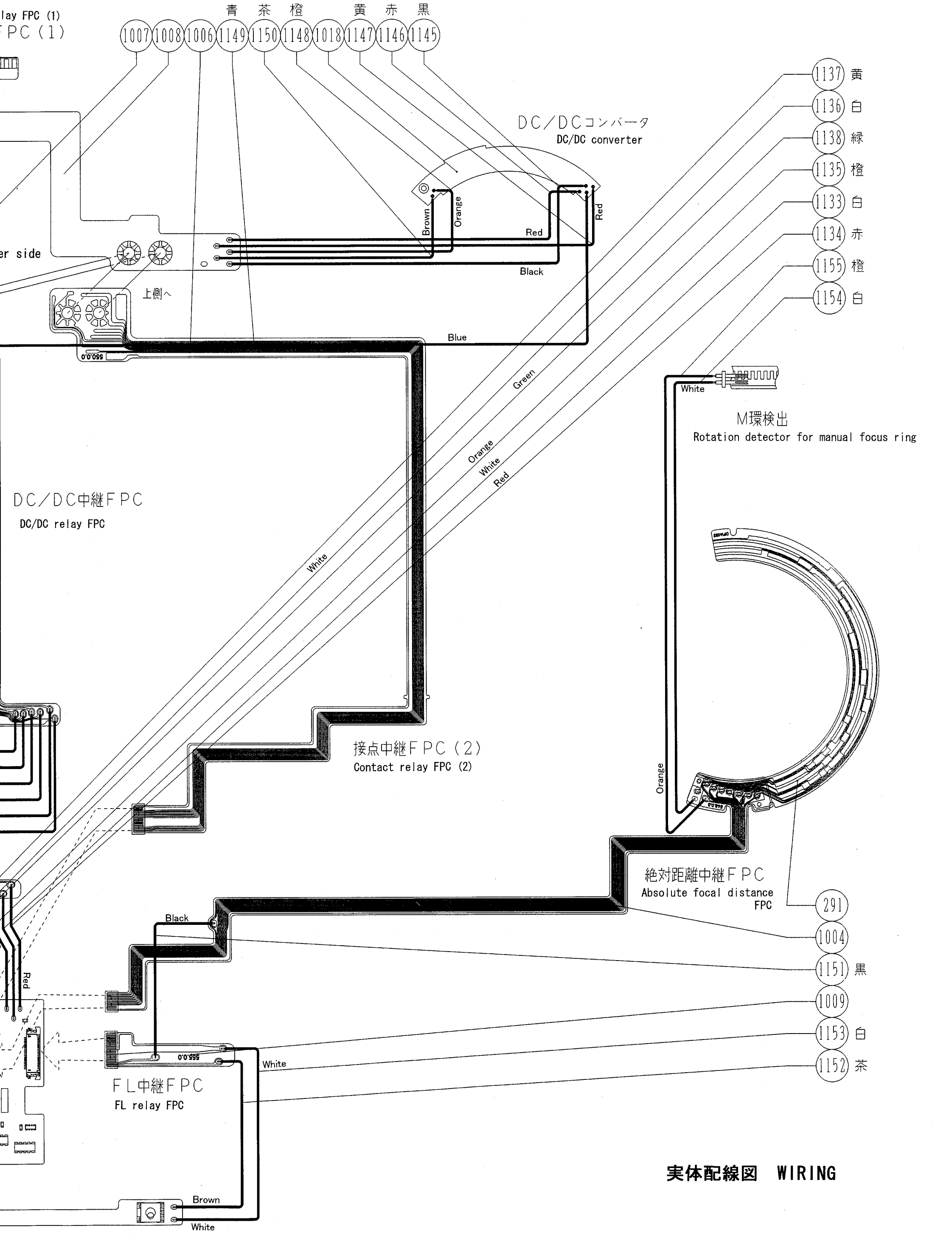
組立図 Structure of the Lens




133
145
57
108 269 33 122 79 34 78 27 58 280 180 252 250 181 254 236 112 105 29 279 123 272 271
92 94 241 297 104 117 31 32 120 134 281 115 98 310 249 253 251 83 114 121 119 278 107 1008 149
49
26
318
59
G13
286
G7
G8
G9
21
160
110
G12
G11
G10
23 125 36
119
30
28
101
321
89 82 55 62 151 92 93 126 154 99 221 283 47 1008 111 166 90 255 237 236 124 173
194 114 80 60 56 209 91 171 191 66 81 96 116 45 103 77 172
74 293 74 239 284 143 323 369 97
15 53 240 244 74 142 100 102 118 75
260
94 201 22 165 162 152 95 141 150 174 206
169 68 164 155 163 153 144 146 135

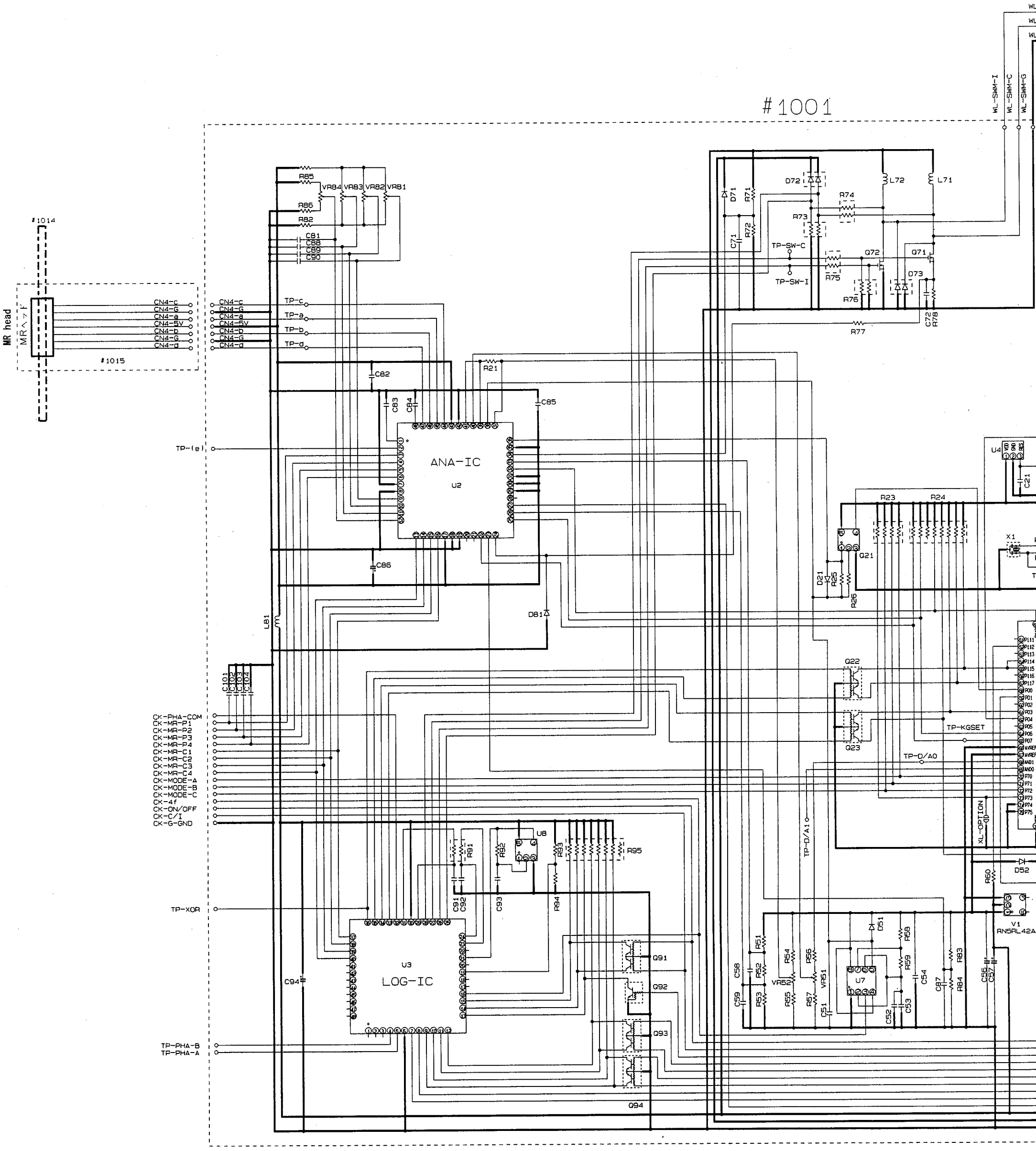
INC

黒 赤 黄
1156 1157 1158
SWM unit
SWMユニット
Contact relay FPC (1)
接点中継FPC(1)
Contact brush
接触ブラシ
Contact
接触
黄 1160
赤 1125
黒 1159
黒 1124
赤 1125
黄 1126
Yellow
Black
Red
Black
Yellow
Contact
接触
To lower side
下側へ
Blue
橙 1129
白 1127
赤 1128
接触ブラシ
Contact brush
M/A switch
M/Aスイッチ
レンジリミッター
Range limitter
白 1127
緑 1132
黄 1131
Red
Orange
White
Red
White
Green
DC/D
DC/DC re
Yellow
Red
Yellow
Black
549.0.0
Yellow
SWM/SW中継FPC
SWM/SW relay FPC
1005
茶 1144
青 1143
橙 1142
黄 1141
赤 1140
黒 1139
Brown
Blue
Orange
Yellow
Red
Black
磁気テープ Magnetic tape
1014
1015
MRセンサー付FPC
FPC with MR sensor
黒 1121
白 1122
青 1123
Black
Blue
White
Yellow
Orange
Red
1001
1010
メインFPC
Main FPC
FL_FPC



実体配線図　WIRING

回路図　CIRCUIT DIAGRAM



#1005-1/2
WL-I-0
WL-C-0
WL-G-0
WL-I-1
WL-C-1
WL-G-1
SWM-UNIT
WL-SWM-I
WL-SWM-C
WL-SWM-G
TP-SCK0
TP-SI0
TP-SO0
TP-RESET
TP-MODE
TP-VPP
TP-VDD
TP-VSS
CN3-SCK0
CN3-SI0
CN3-SO0
CN3-RESET
CN3-MODE
CN3-VPP
CN3-VDD
CN3-VSS
R15
R14
TP-ZM6
TP-ZM5
TP-ZM4
TP-ZM3
TP-ZM2
TP-ZM1
CN3-ZM6
CN3-ZM5
CN3-ZM4
CN3-ZM3
CN3-ZM2
CN3-ZM1
TP-AFL
CN3-AFL
D1
R1
R2
R3
R4
C1
C2
Rotation detector for manual focus ring
TP-M環検出
CN2- M環検出
TP-ABS1
TP-ABS2
TP-ABS3
TP-ABS4
TP-ABS5
TP-ABS6
CN2- マウント
CN2-ABS1
CN2-ABS2
CN2-ABS3
CN2-ABS4
CN2-ABS5
CN2-ABS6
U4
XL-RESET
C21
X1
R27
R28
TP-CLOCK
R5
R6
WL1-AFMODE1
WL1-AFMODE0
WL1- SWマウント
WL1-RL1
WL1-RL0
WL1- SWマウント
#1005-2/2
U1
MCU
R7
R8
R9
R10
TP-A'
R0
TP-A
TP-B
TP-C
TP-D
TP-E
TP-F
TP-G
TP-H
TP-I
TP-J
CN1-A
CN1-B
CN1-C
CN1-D
CN1-E
CN1-F
CN1-G
CN1-H
CN1-I
CN1-J
#1006
接点部材へ
to the contacts
#1008
#1009
CN3-VSS
#1010
フォーカス・ロックSW
Focus・lock SW
CN3-ABS0
CN3-AFL
#291
To Detection brush
#1004
CN2- M環検出
検出プランへ
CN2-ABS1
CN2-ABS2
CN2-ABS3
CN2-ABS4
CN2-ABS5
CN2-ABS6
CN2- マウント
絶対距離エンコーダパターン
Absolute focal distance encoder pattern
XL-KGSET
XL-OPTION
TP-CHECK1
D52
R60
V1
RN5RL42AA
R83
R84
C56
C57
TP-A/D
R62
RT
R29
U6
R30
R31
C22
Q1
Q2
Q4
D3
R13
C4
C5
WL-BAT
WL-DC/DC-CTL
WL-MB2
WL-LV
WL-HV
WL-GND
Screw on mount
ビス止めマウント
#1007
DC／DCコンバータ
DC/DC converter
鏡体へ
Grounding to the lens unit

AF－S400／2.8D Ⅱ　EEPROM

2001-6-25

Address	Contents	CPU			Others
		1.00.00			
0	Optional set value	0			
1	Data for controlling the lens	1			
2	Data for manufacturing processes	－			
3	Value for control and adjust for motor	－			
4	Data for controlling the lens	0			
5	〃	0			
6	〃	0			
7	〃	0			
8	〃	1			
9	〃	1			
10	〃	1			
11	〃	1			
12	〃	0			
13	Unused	－			
｜	｜	｜			
26	Unused	－			
27	Checksum data	－			
28	Data for controlling the lens	－			
｜	｜	｜			
127	Data for controlling the lens	－			

・Each 'value' explained here means the fixed value and the default value.
Of them, there are some changes according to the lens operational condition(s).

・The sign of 「－」 in the table above means a value which changes in accordance with the lens operational condition(s).